

FINAL Programmatic Environmental Impact Statement
for Accomplishing Expanded Civilian Nuclear Energy
Research and Development and Isotope Production Missions in the
United States, Including the Role of the Fast Flux Test Facility

Volume 1 Chapters 1 through 9



Cover photograph and illustration identification, beginning at top center and going clockwise:

- Radioisotope tagged monoclonal antibodies, “smart bullets,” target malignant cells for diagnosis and treatment of diseases
- The Fast Flux Test Facility at the Hanford Site near Richland, Washington
- Illustration of a satellite that could use radioisotope power systems
- The High Flux Isotope Reactor at the Oak Ridge National Laboratory near Oak Ridge, Tennessee
- The Advanced Test Reactor at the Idaho National Engineering and Environmental Laboratory near Idaho Falls, Idaho
- Tip of a remote-handling arm, used for work in developing industrial and medical isotopes

AVAILABILITY OF THE FINAL NI PEIS

General questions regarding this PEIS or for a copy of this PEIS, please contact:

Colette E. Brown, Document Manager
Office of Space and Defense Power Systems (NE-50)
Office of Nuclear Energy, Science and Technology
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874
Attention: NI PEIS
Telephone: (877) 562-4593
E-mail: Nuclear.Infrastructure-PEIS@hq.doe.gov

This PEIS is accessible on the Office of Nuclear Energy, Science and Technology web site at www.nuclear.gov.



Printed with soy ink on recycled paper



Department of Energy

Washington, DC 20585

November 28, 2000

Dear Interested Party:

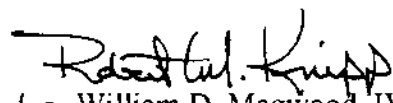
The *Final Programmatic Environmental Impact Statement for Accomplishing Expanded Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, Including the Role of the Fast Flux Test Facility* [NI PEIS]) (DOE/EIS-0310) has now been completed. This document has been prepared in accordance with the National Environmental Policy Act and reflects consideration of comments received on the draft NI PEIS released in July 2000.

The Department of Energy (DOE) is responsible for undertaking research and development activities related to development of nuclear power for civilian use, meeting the nuclear material needs of other Federal agencies, and ensuring the availability of isotopes for medical, industrial, and research applications. The NI PEIS presents an evaluation of the potential environmental impacts associated with the proposed expansion of the nuclear irradiation capabilities for accomplishing civilian nuclear energy research and development activities, accommodating the projected growth in demand for medical and industrial isotopes, and production of plutonium-238 to support future National Aeronautics and Space Administration space exploration missions. In addition to the "No Action" alternative, DOE evaluated other alternatives that include using operating facilities within the DOE complex, building a new research reactor, building one or two accelerators, and restarting the Fast Flux Test Facility (FFTF) that is currently in standby status. In addition, the NI PEIS includes an alternative to permanently deactivate FFTF.

After careful consideration of public comments, environmental impacts, and programmatic objectives, DOE's preferred alternative is to use its existing nuclear facility infrastructure to the extent possible to pursue the missions outlined in the PEIS, i.e., Alternative 2, Option 7. DOE would reestablish domestic production of plutonium-238, as needed, using the Advanced Test Reactor in Idaho and the High Flux Isotope Reactor in Tennessee and would process irradiated plutonium-238 targets at the Radiochemical Engineering Development Center in Tennessee. DOE would permanently deactivate FFTF under the "Preferred Alternative." Lack of clear commitments from likely users discouraged the Department from planning to build new facilities or to restart the FFTF. Further details on the Preferred Alternative can be found in the summary and in section 2.8 of volume 1 of this NI PEIS.

We appreciate your continued participation in this decision-making process.

Sincerely,


for William D. Magwood, IV, Director
Office of Nuclear Energy, Science
and Technology



Printed with soy ink on recycled paper

Cover Sheet

Responsible Agency: United States Department of Energy (DOE)

Title: *Final Programmatic Environmental Impact Statement for Accomplishing Expanded Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, Including the Role of the Fast Flux Test Facility (NI PEIS)*

Locations: Idaho, Tennessee, Washington

Contacts: For copies of this programmatic environmental impact statement (PEIS), call toll-free (877) 562-4593

For additional information on this Final PEIS, contact:

Colette E. Brown, Document Manager
Office of Space and Defense Power
Systems (NE-50)
Office of Nuclear Energy, Science and Technology
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874
Attention: NI PEIS
Telephone: (877) 562-4593

For general information on the DOE National Environmental Policy Act (NEPA) process, contact:

Carol M. Borgstrom, Director
Office of NEPA Policy and Compliance (EH-42)
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585
Telephone: (202) 586-4600, or leave a message at (800) 472-2756

Abstract: Under the authority of the Atomic Energy Act of 1954, as amended, the DOE is responsible for ensuring the availability of isotopes for medical, industrial and research applications, meeting the nuclear material needs of other Federal agencies, and undertaking research and development activities related to development of nuclear power for civilian use. To meet these responsibilities, DOE maintains nuclear infrastructure capabilities that support various missions. Current estimates for the future needs of medical and industrial isotopes, plutonium-238, and research requirements indicate that the current infrastructure may soon be insufficient to meet the projected demands. DOE proposes to enhance these capabilities to provide for: (1) production of isotopes for medical and industrial uses, (2) production of plutonium-238 for use in advanced radioisotope power systems for future National Aeronautics and Space Administration (NASA) space exploration missions, and (3) the Nation's nuclear research and development needs for civilian application.

This NI PEIS evaluates the environmental impacts of a No Action Alternative (maintaining status quo), four alternative strategies to accomplish this mission, and an alternative to permanently deactivate the Fast Flux Test Facility (FFTF), with no new missions. Alternatives 2, 3, and 4 also include permanent deactivation of FFTF. The alternatives are:

No Action

1. Restart FFTF at Hanford, Washington
2. Use only existing operational facilities
3. Construct one or two new accelerators
4. Construct a new research reactor
5. Permanently deactivate FFTF (with no new missions)

The Preferred Alternative is Alternative 2, Option 7, Use Only Existing Operational Facilities. DOE would reestablish domestic production of plutonium-238, as needed, using the Advanced Test Reactor in Idaho and the High Flux Isotope Reactor in Tennessee, and would process irradiated plutonium-238 targets at the Radiochemical Engineering Development Center in Tennessee. DOE would permanently deactivate FFTF under the Preferred Alternative.

Public Comments: The Draft NI PEIS was issued for public review and comment on July 21, 2000. The comment period ended on September 18, 2000, although late comments were considered to the extent practicable. Public hearings were held to obtain comments on the Draft NI PEIS in Oak Ridge, Tennessee; Idaho Falls, Idaho; Hood River and Portland, Oregon; Seattle and Richland, Washington; and Arlington, Virginia. All comments were considered by DOE in preparing the Final NI PEIS, which also incorporates any new information received since issuance of the Draft NI PEIS. In response to comments on the Draft NI PEIS and as a result of information that was unavailable at the time of the issuance of the Draft PEIS, the Final PEIS contains revisions and new information, indicated by a sidebar in the margin. Volume 3 contains the comments received during the public review period for the Draft NI PEIS and DOE's responses to these comments. DOE will use the analyses presented in the Final NI PEIS as well as other information, including public input, costs, nonproliferation impacts, schedules, technical assurance, and other policy and programmatic objectives, in preparing the Record of Decision for accomplishing expanded civilian nuclear energy research and development and isotope production missions in the United States, including the role of FFTF. DOE will issue the Record of Decision no sooner than 30 days after the U.S. Environmental Protection Agency publishes a notice of availability of the Final NI PEIS in the Federal Register.

Table of Contents

Table of Contents	i
List of Figures	xxiii
List of Tables	xxvi
List of Acronyms	xxxix

Volume 1

Chapter 1

Introduction	1-1
1.1 Background	1-1
1.2 Purpose and Need for Agency Action	1-1
1.2.1 Medical and Industrial Isotope Production	1-2
1.2.2 Plutonium-238 Production for Space Missions	1-5
1.2.3 Civilian Nuclear Energy Research and Development	1-9
1.3 Decisions to be Made	1-10
1.4 Issues Identified During the Scoping Process	1-11
1.5 Issues Raised During the Public Comment Period on the Draft NI PEIS	1-14
1.5.1 Purpose and Need for the Proposed Action	1-15
1.5.2 Impact of FFTF Restart on Hanford Cleanup	1-16
1.5.3 Waste Management and Spent Nuclear Fuel	1-16
1.5.4 Cost of the Various Alternatives	1-17
1.5.5 Nuclear Nonproliferation Policy	1-18
1.5.6 Public Involvement	1-18
1.5.7 Environmental Impacts	1-19
1.6 Alternatives Evaluated in This NI PEIS	1-20
1.7 Related NEPA Reviews	1-21
1.8 Changes from the Draft NI PEIS	1-30
1.9 Structure of This NI PEIS	1-33
1.10 References	1-36

Chapter 2

Program Description and Alternatives	2-1
2.1 Introduction	2-1
2.2 Description of Operations	2-2
2.2.1 Medical Isotopes Production	2-2
2.2.1.1 Target Fabrication	2-2
2.2.1.2 Target Irradiation	2-4
2.2.1.3 Postirradiation Target Processing	2-4
2.2.2 Plutonium-238 Production	2-5
2.2.2.1 Target Fabrication	2-5
2.2.2.2 Target Irradiation	2-6
2.2.2.3 Postirradiation Target Processing	2-7
2.2.3 Civilian Nuclear Energy Research and Development	2-9
2.3 Description of Facilities	2-9

2.3.1	Target Irradiation Facilities	2-9
2.3.1.1	Fast Flux Test Facility	2-9
2.3.1.1.1	Maintenance of FFTF in Standby	2-10
2.3.1.1.2	FFTF Restart and Operation	2-10
2.3.1.1.3	FFTF Fuel Use Option	2-13
2.3.1.1.4	FFTF Irradiation Operations	2-14
2.3.1.1.5	FFTF Deactivation	2-15
2.3.1.2	Advanced Test Reactor	2-15
2.3.1.3	High Flux Isotope Reactor	2-21
2.3.1.4	Commercial Light Water Reactor	2-24
2.3.1.5	New Accelerator(s)	2-27
2.3.1.5.1	Low-Energy Accelerator	2-27
2.3.1.5.2	High-Energy Accelerator	2-28
2.3.1.6	New Research Reactor	2-30
2.3.2	Target Fabrication and Postirradiation Processing Facilities	2-36
2.3.2.1	Radiochemical Engineering Development Center	2-36
2.3.2.2	Fluorinel Dissolution Process Facility	2-38
2.3.2.3	Fuels and Materials Examination Facility	2-40
2.3.2.4	Radiochemical Processing Laboratory and Building 306-E	2-43
2.3.2.4.1	Radiochemical Processing Laboratory	2-43
2.3.2.4.2	Building 306-E	2-48
2.3.2.5	New Support Facility	2-48
2.4	Description of Transportation Activities	2-52
2.4.1	Purchase of Plutonium-238 from Russia	2-52
2.4.2	Transportation of Plutonium-238 from St. Petersburg, Russia, to the Los Alamos National Laboratory	2-52
2.4.3	Transportation of Neptunium-237 from Savannah River Site to Candidate Storage Facilities	2-52
2.4.4	Transportation of Mixed Oxide Fuel from Europe to the Fast Flux Test Facility	2-54
2.4.5	Transportation of Neptunium-237 from Savannah River Site to Target Fabrication Facilities	2-56
2.4.6	Transportation of Nonirradiated and Irradiated Targets	2-56
2.4.7	Transportation of Plutonium-238 Product to the Los Alamos National Laboratory	2-56
2.4.8	Transportation of Materials for Medical Isotope Production	2-56
2.5	Description of Alternatives	2-57
2.5.1	No Action Alternative	2-59
2.5.2	Alternative 1—Restart FFTF	2-59
2.5.3	Alternative 2—Use Only Existing Operational Facilities	2-60
2.5.4	Alternative 3—Construct New Accelerator(s)	2-62
2.5.5	Alternative 4—Construct New Research Reactor	2-64
2.5.6	Alternative 5—Permanently Deactivate FFTF (with No New Missions)	2-65
2.6	Alternatives Considered and Dismissed	2-65
2.6.1	Irradiation Facilities Dismissed	2-66
2.6.2	Processing Facilities Dismissed	2-69
2.7	Summary of Environmental Impacts, Schedules, and Mission Effectiveness	2-71
2.7.1	Summary of Environmental Impacts	2-71
2.7.1.1	Radiological and Hazardous Chemical Impacts	2-71
2.7.1.2	Generation and Disposition of Waste and Spent Nuclear Fuel	2-77
2.7.1.3	Water Use	2-80
2.7.1.4	Air Quality	2-80

2.7.1.5	Socioeconomics	2-86
2.7.1.6	Transportation Impacts	2-86
2.7.1.7	Resource Areas Discussed in Less Detail	2-91
2.7.1.7.1	Land Use	2-91
2.7.1.7.2	Visual Resources	2-91
2.7.1.7.3	Noise	2-91
2.7.1.7.4	Water Quality	2-91
2.7.1.7.5	Geology and Soils	2-92
2.7.1.7.6	Ecology	2-92
2.7.1.7.7	Cultural Resources	2-92
2.7.1.7.8	Environmental Justice	2-93
2.7.1.8	Industrial Safety	2-94
2.7.2	Implementation Schedule	2-95
2.7.3	Comparison of Mission Effectiveness Among Alternatives	2-100
2.8	Preferred Alternative	2-103
2.9	References	2-104

Chapter 3

	Affected Environment	3-1
3.1	Approach to Defining the Affected Environment	3-1
3.2	Oak Ridge Reservation	3-3
3.2.1	Land Resources	3-3
3.2.1.1	Land Use	3-3
3.2.1.1.1	General Site Description	3-4
3.2.1.1.2	Location of Proposed Activities	3-6
3.2.1.2	Visual Resources	3-6
3.2.1.2.1	General Site Description	3-6
3.2.1.2.2	Location of Proposed Activities	3-6
3.2.2	Noise	3-6
3.2.2.1	General Site Description	3-7
3.2.2.2	Location of Proposed Activities	3-7
3.2.3	Air Quality	3-7
3.2.3.1	General Site Description	3-7
3.2.3.2	Location of Proposed Activities	3-9
3.2.4	Water Resources	3-10
3.2.4.1	Surface Water	3-10
3.2.4.1.1	General Site Description	3-10
3.2.4.1.2	Location of Proposed Activities	3-13
3.2.4.2	Groundwater	3-15
3.2.4.2.1	General Site Description	3-15
3.2.4.2.2	Location of Proposed Activities	3-17
3.2.5	Geology and Soils	3-17
3.2.5.1	General Site Description	3-18
3.2.5.2	Location of Proposed Activities	3-20
3.2.6	Ecological Resources	3-21
3.2.6.1	Terrestrial Resources	3-21
3.2.6.1.1	General Site Description	3-21
3.2.6.1.2	Location of Proposed Activities	3-21
3.2.6.2	Wetlands	3-21

	3.2.6.2.1	General Site Description	3–23
	3.2.6.2.2	Location of Proposed Activities	3–23
3.2.6.3		Aquatic Resources	3–23
	3.2.6.3.1	General Site Description	3–23
	3.2.6.3.2	Location of Proposed Activities	3–23
3.2.6.4		Threatened and Endangered Species	3–24
	3.2.6.4.1	General Site Description	3–24
	3.2.6.4.2	Location of Proposed Activities	3–24
3.2.7		Cultural and Paleontological Resources	3–24
3.2.7.1		Prehistoric Resources	3–25
	3.2.7.1.1	General Site Description	3–25
	3.2.7.1.2	Location of Proposed Activities	3–25
3.2.7.2		Historic Resources	3–25
	3.2.7.2.1	General Site Description	3–25
	3.2.7.2.2	Location of Proposed Activities	3–26
3.2.7.3		Native American Resources	3–26
	3.2.7.3.1	General Site Description	3–26
	3.2.7.3.2	Location of Proposed Activities	3–26
3.2.7.4		Paleontological Resources	3–26
	3.2.7.4.1	General Site Description	3–26
	3.2.7.4.2	Location of Proposed Activities	3–26
3.2.8		Socioeconomics	3–27
3.2.8.1		Regional Economic Characteristics	3–27
3.2.8.2		Population and Housing	3–27
3.2.8.3		Community Services	3–27
	3.2.8.3.1	Education	3–27
	3.2.8.3.2	Public Safety	3–27
	3.2.8.3.3	Health Care	3–28
3.2.8.4		Local Transportation	3–28
3.2.9		Existing Human Health Risk	3–28
3.2.9.1		Radiation Exposure and Risk	3–28
	3.2.9.1.1	General Site Description	3–28
	3.2.9.1.2	Location of Proposed Activities	3–30
3.2.9.2		Chemical Environment	3–31
3.2.9.3		Health Effects Studies	3–32
3.2.9.4		Accident History	3–32
3.2.9.5		Emergency Preparedness	3–33
3.2.10		Environmental Justice	3–33
3.2.11		Waste Management	3–34
	3.2.11.1	Waste Inventories and Activities	3–34
	3.2.11.2	High-Level Radioactive Waste	3–38
	3.2.11.3	Transuranic Waste	3–38
	3.2.11.4	Low-Level Radioactive Waste	3–39
	3.2.11.5	Mixed Low-Level Radioactive Waste	3–40
	3.2.11.6	Hazardous Waste	3–41
	3.2.11.7	Nonhazardous Waste	3–41
	3.2.11.8	Waste Minimization	3–41
	3.2.11.9	Waste Management PEIS Records of Decision	3–42
3.3		Idaho National Engineering and Environmental Laboratory	3–43
3.3.1		Land Resources	3–43

3.3.1.1	Land Use	3-43
3.3.1.1.1	General Site Description	3-43
3.3.1.1.2	Locations of Proposed Activities	3-45
3.3.1.2	Visual Resources	3-46
3.3.1.2.1	General Site Description	3-46
3.3.1.2.2	Locations of Proposed Activities	3-46
3.3.2	Noise	3-47
3.3.2.1	General Site Description	3-47
3.3.2.2	Locations of Proposed Activities	3-47
3.3.3	Air Quality	3-48
3.3.3.1	General Site Description	3-48
3.3.3.2	Locations of Proposed Activities	3-51
3.3.4	Water Resources	3-51
3.3.4.1	Surface Water	3-52
3.3.4.1.1	General Site Description	3-52
3.3.4.1.2	Locations of Proposed Activities	3-54
3.3.4.2	Groundwater	3-56
3.3.4.2.1	General Site Description	3-56
3.3.4.2.2	Locations of Proposed Activities	3-58
3.3.5	Geology and Soils	3-60
3.3.5.1	General Site Description	3-60
3.3.5.2	Locations of Proposed Activities	3-63
3.3.6	Ecological Resources	3-64
3.3.6.1	Terrestrial Resources	3-64
3.3.6.1.1	General Site Description	3-64
3.3.6.1.2	Locations of Proposed Activities	3-66
3.3.6.2	Wetlands	3-66
3.3.6.2.1	General Site Description	3-66
3.3.6.2.2	Locations of Proposed Activities	3-67
3.3.6.3	Aquatic Resources	3-67
3.3.6.3.1	General Site Description	3-67
3.3.6.3.2	Locations of Proposed Activities	3-67
3.3.6.4	Threatened and Endangered Species	3-68
3.3.6.4.1	General Site Description	3-68
3.3.6.4.2	Locations of Proposed Activities	3-68
3.3.7	Cultural and Paleontological Resources	3-68
3.3.7.1	Prehistoric Resources	3-69
3.3.7.1.1	General Site Description	3-69
3.3.7.1.2	Locations of Proposed Activities	3-69
3.3.7.2	Historic Resources	3-70
3.3.7.2.1	General Site Description	3-70
3.3.7.2.2	Locations of Proposed Activities	3-70
3.3.7.3	Native American Resources	3-70
3.3.7.3.1	General Site Description	3-71
3.3.7.3.2	Locations of Proposed Activities	3-71
3.3.7.4	Paleontological Resources	3-71
3.3.7.4.1	General Site Description	3-71
3.3.7.4.2	Locations of Proposed Activities	3-72
3.3.8	Socioeconomics	3-72
3.3.8.1	Regional Economic Characteristics	3-72

3.3.8.2	Population and Housing	3-72
3.3.8.3	Community Services	3-73
3.3.8.3.1	Education	3-73
3.3.8.3.2	Public Safety	3-73
3.3.8.3.3	Health Care	3-73
3.3.8.4	Local Transportation	3-73
3.3.9	Existing Human Health Risk	3-74
3.3.9.1	Radiation Exposure and Risk	3-74
3.3.9.1.1	General Site Description	3-74
3.3.9.1.2	Locations of Proposed Activities	3-76
3.3.9.2	Chemical Environment	3-77
3.3.9.3	Health Effects Studies	3-78
3.3.9.4	Accident History	3-78
3.3.9.5	Emergency Preparedness	3-79
3.3.10	Environmental Justice	3-79
3.3.11	Waste Management	3-80
3.3.11.1	Waste Inventories and Activities	3-80
3.3.11.2	High-Level Radioactive Waste	3-83
3.3.11.3	Transuranic and Mixed Transuranic Waste	3-84
3.3.11.4	Low-Level Radioactive Waste	3-84
3.3.11.5	Mixed Low-Level Radioactive Waste	3-85
3.3.11.6	Hazardous Waste	3-85
3.3.11.7	Nonhazardous Waste	3-86
3.3.11.8	Waste Minimization	3-86
3.3.11.9	Waste Management PEIS Records of Decision	3-86
3.4	Hanford Site	3-88
3.4.1	Land Resources	3-91
3.4.1.1	Land Use	3-91
3.4.1.1.1	General Site Description	3-91
3.4.1.1.2	Locations of Proposed Activities	3-92
3.4.1.2	Visual Resources	3-93
3.4.1.2.1	General Site Description	3-93
3.4.1.2.2	Locations of Proposed Activities	3-94
3.4.2	Noise	3-94
3.4.2.1	General Site Description	3-94
3.4.2.2	Locations of Proposed Activities	3-95
3.4.3	Air Quality	3-95
3.4.3.1	General Site Description	3-95
3.4.3.2	Locations of Proposed Activities	3-98
3.4.4	Water Resources	3-98
3.4.4.1	Surface Water	3-98
3.4.4.1.1	General Site Description	3-98
3.4.4.1.2	Locations of Proposed Activities	3-105
3.4.4.2	Groundwater	3-106
3.4.4.2.1	General Site Description	3-106
3.4.4.2.2	Locations of Proposed Activities	3-109
3.4.5	Geology and Soils	3-114
3.4.5.1	General Site Description	3-114
3.4.5.2	Locations of Proposed Activities	3-116
3.4.6	Ecological Resources	3-117

3.4.6.1	Terrestrial Resources	3-117
3.4.6.1.1	General Site Description	3-117
3.4.6.1.2	Locations of Proposed Activities	3-119
3.4.6.2	Wetlands	3-119
3.4.6.2.1	General Site Description	3-120
3.4.6.2.2	Locations of Proposed Activities	3-120
3.4.6.3	Aquatic Resources	3-120
3.4.6.3.1	General Site Description	3-120
3.4.6.3.2	Locations of Proposed Activities	3-121
3.4.6.4	Threatened and Endangered Species	3-121
3.4.6.4.1	General Site Description	3-121
3.4.6.4.2	Locations of Proposed Activities	3-122
3.4.7	Cultural and Paleontological Resources	3-122
3.4.7.1	Prehistoric Resources	3-123
3.4.7.1.1	General Site Description	3-123
3.4.7.1.2	Locations of Proposed Activities	3-124
3.4.7.2	Historic Resources	3-124
3.4.7.2.1	General Site Description	3-124
3.4.7.2.2	Locations of Proposed Activities	3-125
3.4.7.3	Native American Resources	3-125
3.4.7.3.1	General Site Description	3-125
3.4.7.3.2	Locations of Proposed Activities	3-126
3.4.7.4	Paleontological Resources	3-126
3.4.7.4.1	General Site Description	3-126
3.4.7.4.2	Locations of Proposed Activities	3-126
3.4.8	Socioeconomics	3-127
3.4.8.1	Regional Economic Characteristics	3-127
3.4.8.2	Population and Housing	3-127
3.4.8.3	Community Services	3-127
3.4.8.3.1	Education	3-127
3.4.8.3.2	Public Safety	3-128
3.4.8.3.3	Health Care	3-128
3.4.8.4	Local Transportation	3-128
3.4.9	Existing Human Health Risk	3-128
3.4.9.1	Radiation Exposure and Risk	3-129
3.4.9.1.1	General Site Description	3-129
3.4.9.1.2	Locations of Proposed Activities	3-131
3.4.9.2	Chemical Environment	3-131
3.4.9.3	Health Effects Studies	3-132
3.4.9.4	Accident History	3-133
3.4.9.5	Emergency Preparedness	3-134
3.4.10	Environmental Justice	3-134
3.4.11	Waste Management	3-135
3.4.11.1	Waste Inventories and Activities	3-135
3.4.11.2	High-Level Radioactive Waste	3-138
3.4.11.3	Transuranic and Mixed Transuranic Waste	3-138
3.4.11.4	Low-Level Radioactive Waste	3-138
3.4.11.5	Mixed Low-Level Radioactive Waste	3-138
3.4.11.6	Hazardous Waste	3-139
3.4.11.7	Nonhazardous Waste	3-139

	3.4.11.8	Waste Minimization	3-140
	3.4.11.9	Waste Management PEIS Records of Decision	3-140
	3.4.12	Spent Nuclear Fuel	3-141
3.5		Generic Commercial Light Water Reactor Site	3-142
	3.5.1	Land Resources	3-142
	3.5.1.1	Land Use	3-142
	3.5.1.2	Visual Resources	3-144
	3.5.2	Noise	3-144
	3.5.3	Air Quality	3-144
	3.5.4	Water Resources	3-145
	3.5.5	Geology and Soils	3-146
	3.5.6	Ecological Resources	3-146
	3.5.6.1	Terrestrial Resources	3-146
	3.5.6.2	Wetlands	3-147
	3.5.6.3	Aquatic Resources	3-147
	3.5.6.4	Threatened and Endangered Species	3-147
	3.5.7	Cultural and Paleontological Resources	3-147
	3.5.7.1	Prehistoric Resources	3-147
	3.5.7.2	Historic Resources	3-147
	3.5.7.3	Native American Resources	3-148
	3.5.7.4	Paleontological Resources	3-148
	3.5.8	Socioeconomics	3-148
	3.5.8.1	Regional Economic Characteristics	3-148
	3.5.8.2	Population and Housing	3-149
	3.5.8.3	Community Services and Local Transportation	3-149
	3.5.9	Existing Human Health Risk	3-149
	3.5.9.1	Radiation Exposure and Risk	3-149
	3.5.9.2	Chemical Environment	3-151
	3.5.9.3	Health Effects Studies	3-152
	3.5.9.4	Accident History	3-152
	3.5.9.5	Emergency Preparedness	3-152
	3.5.10	Environmental Justice	3-152
	3.5.11	Waste Management	3-152
	3.5.11.1	Waste Inventories and Activities	3-152
	3.5.11.2	Transuranic Waste	3-153
	3.5.11.3	Low-Level Radioactive Waste	3-153
	3.5.11.4	Mixed Low-Level Radioactive Waste	3-154
	3.5.11.5	Hazardous Waste	3-154
	3.5.11.6	Nonhazardous Waste	3-154
	3.5.11.7	Waste Minimization	3-154
3.6		DOE Site for New Accelerator(s) or a New Research Reactor	3-155
	3.6.1	Land Resources	3-155
	3.6.1.1	Land Use	3-155
	3.6.1.2	Visual Resources	3-156
	3.6.2	Noise	3-156
	3.6.3	Air Quality	3-156
	3.6.4	Water Resources	3-157
	3.6.5	Geology and Soils	3-157
	3.6.6	Ecological Resources	3-158
	3.6.6.1	Terrestrial Resources	3-158

3.6.6.2	Wetlands	3-159
3.6.6.3	Aquatic Resources	3-159
3.6.6.4	Threatened and Endangered Species	3-159
3.6.7	Cultural and Paleontological Resources	3-159
3.6.7.1	Prehistoric Resources	3-159
3.6.7.2	Historic Resources	3-160
3.6.7.3	Native American Resources	3-160
3.6.7.4	Paleontological Resources	3-160
3.6.8	Socioeconomics	3-160
3.6.9	Existing Human Health Risk	3-161
3.6.9.1	Radiation Exposure and Risk	3-161
3.6.9.2	Chemical Environment	3-162
3.6.9.3	Health Effects Studies	3-163
3.6.9.4	Accident History	3-163
3.6.9.5	Emergency Preparedness	3-163
3.6.10	Environmental Justice	3-164
3.6.11	Waste Management	3-164
3.6.11.1	Waste Inventories and Activities	3-164
3.6.11.2	High-Level Radioactive Waste	3-164
3.6.11.3	Transuranic and Mixed Transuranic Waste	3-165
3.6.11.4	Low-Level Radioactive Waste	3-165
3.6.11.5	Mixed Low-Level Radioactive Waste	3-165
3.6.11.6	Hazardous Waste	3-166
3.6.11.7	Nonhazardous Waste	3-166
3.6.11.8	Waste Minimization	3-166
3.6.12	Spent Nuclear Fuel	3-166
3.7	References	3-167

Chapter 4

	Environmental Consequences	4-1
4.1	Introduction	4-1
4.2	No Action Alternative	4-3
4.2.1	No Action Alternative—Option 1	4-3
4.2.1.1	Importation of Plutonium-238 from Russia	4-3
4.2.1.2	Maintenance of FFTF in Standby	4-4
4.2.1.2.1	Land Resources	4-5
4.2.1.2.2	Noise	4-5
4.2.1.2.3	Air Quality	4-5
4.2.1.2.4	Water Resources	4-5
4.2.1.2.5	Geology and Soils	4-6
4.2.1.2.6	Ecological Resources	4-6
4.2.1.2.7	Cultural and Paleontological Resources	4-7
4.2.1.2.8	Socioeconomics	4-7
4.2.1.2.9	Public and Occupational Health and Safety—Normal Standby Activities	4-7
4.2.1.2.10	Public and Occupational Health and Safety—Standby Accidents	4-9
4.2.1.2.11	Public and Occupational Health and Safety—Transportation	4-10
4.2.1.2.12	Environmental Justice	4-10

	4.2.1.2.13	Waste Management	4-11
	4.2.1.2.14	Spent Nuclear Fuel Management	4-13
4.2.2	No Action Alternative—Option 2		4-13
4.2.2.1	Importation of Plutonium-238 from Russia		4-13
4.2.2.2	Transportation and Storage		4-13
	4.2.2.2.1	Land Resources	4-14
	4.2.2.2.2	Noise	4-14
	4.2.2.2.3	Air Quality	4-14
	4.2.2.2.4	Water Resources	4-14
	4.2.2.2.5	Geology and Soils	4-14
	4.2.2.2.6	Ecological Resources	4-15
	4.2.2.2.7	Cultural and Paleontological Resources	4-15
	4.2.2.2.8	Socioeconomics	4-15
	4.2.2.2.9	Public and Occupational Health and Safety—Normal Operations	4-15
	4.2.2.2.10	Public and Occupational Health and Safety—Facility Accidents	4-17
	4.2.2.2.11	Public and Occupational Health and Safety—Transportation	4-17
	4.2.2.2.12	Environmental Justice	4-18
	4.2.2.2.13	Waste Management	4-19
4.2.2.3	Maintenance of FFTF in Standby		4-19
4.2.3	No Action Alternative—Option 3		4-19
4.2.3.1	Importation of Plutonium-238 from Russia		4-19
4.2.3.2	Transportation and Storage		4-19
	4.2.3.2.1	Land Resources	4-20
	4.2.3.2.2	Noise	4-20
	4.2.3.2.3	Air Quality	4-20
	4.2.3.2.4	Water Resources	4-20
	4.2.3.2.5	Geology and Soils	4-20
	4.2.3.2.6	Ecological Resources	4-21
	4.2.3.2.7	Cultural and Paleontological Resources	4-21
	4.2.3.2.8	Socioeconomics	4-21
	4.2.3.2.9	Public and Occupational Health and Safety—Normal Operations	4-22
	4.2.3.2.10	Public and Occupational Health and Safety—Facility Accidents	4-23
	4.2.3.2.11	Public and Occupational Health and Safety—Transportation	4-23
	4.2.3.2.12	Environmental Justice	4-24
	4.2.3.2.13	Waste Management	4-24
4.2.3.3	Maintenance of FFTF in Standby		4-25
4.2.4	No Action Alternative—Option 4		4-25
4.2.4.1	Importation of Plutonium-238 from Russia		4-25
4.2.4.2	Transportation and Storage		4-25
	4.2.4.2.1	Land Resources	4-25
	4.2.4.2.2	Noise	4-25
	4.2.4.2.3	Air Quality	4-26
	4.2.4.2.4	Water Resources	4-26
	4.2.4.2.5	Geology and Soils	4-26
	4.2.4.2.6	Ecological Resources	4-26
	4.2.4.2.7	Cultural and Paleontological Resources	4-27

	4.2.4.2.8	Socioeconomics	4-27
	4.2.4.2.9	Public and Occupational Health and Safety—Normal Operations	4-27
	4.2.4.2.10	Public and Occupational Health and Safety—Facility Accidents	4-29
	4.2.4.2.11	Public and Occupational Health and Safety—Transportation	4-29
	4.2.4.2.12	Environmental Justice	4-29
	4.2.4.2.13	Waste Management	4-30
	4.2.4.3	Maintenance of FFTF in Standby	4-30
4.3	Alternative 1—Restart FFTF		4-31
	4.3.1	Alternative 1 (Restart FFTF)—Option 1	4-32
	4.3.1.1	Operations and Transportation	4-33
	4.3.1.1.1	Land Resources	4-33
	4.3.1.1.2	Noise	4-34
	4.3.1.1.3	Air Quality	4-34
	4.3.1.1.4	Water Resources	4-36
	4.3.1.1.5	Geology and Soils	4-38
	4.3.1.1.6	Ecological Resources	4-38
	4.3.1.1.7	Cultural and Paleontological Resources	4-39
	4.3.1.1.8	Socioeconomics	4-40
	4.3.1.1.9	Public and Occupational Health and Safety—Normal Operations	4-41
	4.3.1.1.10	Public and Occupational Health and Safety—Facility Accidents	4-44
	4.3.1.1.11	Public and Occupational Health and Safety—Transportation	4-48
	4.3.1.1.12	Environmental Justice	4-49
	4.3.1.1.13	Waste Management	4-50
	4.3.1.1.14	Spent Nuclear Fuel Management	4-55
	4.3.2	Alternative 1 (Restart FFTF)—Option 2	4-57
	4.3.2.1	Operations and Transportation	4-57
	4.3.2.1.1	Land Resources	4-58
	4.3.2.1.2	Noise	4-58
	4.3.2.1.3	Air Quality	4-59
	4.3.2.1.4	Water Resources	4-60
	4.3.2.1.5	Geology and Soils	4-60
	4.3.2.1.6	Ecological Resources	4-61
	4.3.2.1.7	Cultural and Paleontological Resources	4-61
	4.3.2.1.8	Socioeconomics	4-62
	4.3.2.1.9	Public and Occupational Health and Safety—Normal Operations	4-62
	4.3.2.1.10	Public and Occupational Health and Safety—Facility Accidents	4-64
	4.3.2.1.11	Public and Occupational Health and Safety—Transportation	4-69
	4.3.2.1.12	Environmental Justice	4-70
	4.3.2.1.13	Waste Management	4-71
	4.3.2.1.14	Spent Nuclear Fuel Management	4-74
	4.3.3	Alternative 1 (Restart FFTF)—Option 3	4-74
	4.3.3.1	Operations and Transportation	4-74
	4.3.3.1.1	Land Resources	4-75
	4.3.3.1.2	Noise	4-75

	4.3.3.1.3	Air Quality	4-75
	4.3.3.1.4	Water Resources	4-76
	4.3.3.1.5	Geology and Soils	4-77
	4.3.3.1.6	Ecological Resources	4-78
	4.3.3.1.7	Cultural and Paleontological Resources	4-78
	4.3.3.1.8	Socioeconomics	4-78
	4.3.3.1.9	Public and Occupational Health and Safety—Normal Operations	4-79
	4.3.3.1.10	Public and Occupational Health and Safety—Facility Accidents	4-81
	4.3.3.1.11	Public and Occupational Health and Safety—Transportation .	4-85
	4.3.3.1.12	Environmental Justice	4-86
	4.3.3.1.13	Waste Management	4-87
	4.3.3.1.14	Spent Nuclear Fuel Management	4-90
4.3.4	Alternative 1 (Restart FFTF)—Option 4		4-90
	4.3.4.1	Operations and Transportation	4-90
	4.3.4.1.1	Land Resources	4-90
	4.3.4.1.2	Noise	4-91
	4.3.4.1.3	Air Quality	4-91
	4.3.4.1.4	Water Resources	4-91
	4.3.4.1.5	Geology and Soils	4-91
	4.3.4.1.6	Ecological Resources	4-92
	4.3.4.1.7	Cultural and Paleontological Resources	4-92
	4.3.4.1.8	Socioeconomics	4-92
	4.3.4.1.9	Public and Occupational Health and Safety—Normal Operations	4-92
	4.3.4.1.10	Public and Occupational Health and Safety—Facility Accidents	4-92
	4.3.4.1.11	Public and Occupational Health and Safety—Transportation .	4-93
	4.3.4.1.12	Environmental Justice	4-96
	4.3.4.1.13	Waste Management	4-96
	4.3.4.1.14	Spent Nuclear Fuel Management	4-97
4.3.5	Alternative 1 (Restart FFTF)—Option 5		4-97
	4.3.5.1	Operations and Transportation	4-97
	4.3.5.1.1	Land Resources	4-97
	4.3.5.1.2	Noise	4-98
	4.3.5.1.3	Air Quality	4-98
	4.3.5.1.4	Water Resources	4-98
	4.3.5.1.5	Geology and Soils	4-98
	4.3.5.1.6	Ecological Resources	4-98
	4.3.5.1.7	Cultural and Paleontological Resources	4-99
	4.3.5.1.8	Socioeconomics	4-99
	4.3.5.1.9	Public and Occupational Health and Safety—Normal Operations	4-99
	4.3.5.1.10	Public and Occupational Health and Safety—Facility Accidents	4-99
	4.3.5.1.11	Public and Occupational Health and Safety—Transportation	4-102
	4.3.5.1.12	Environmental Justice	4-103
	4.3.5.1.13	Waste Management	4-103
	4.3.5.1.14	Spent Nuclear Fuel Management	4-103

4.3.6	Alternative 1 (Restart FFTF)—Option 6	4-103
4.3.6.1	Operations and Transportation	4-104
4.3.6.1.1	Land Resources	4-104
4.3.6.1.2	Noise	4-104
4.3.6.1.3	Air Quality	4-104
4.3.6.1.4	Water Resources	4-104
4.3.6.1.5	Geology and Soils	4-104
4.3.6.1.6	Ecological Resources	4-105
4.3.6.1.7	Cultural and Paleontological Resources	4-105
4.3.6.1.8	Socioeconomics	4-105
4.3.6.1.9	Public and Occupational Health and Safety—Normal Operations	4-105
4.3.6.1.10	Public and Occupational Health and Safety—Facility Accidents	4-105
4.3.6.1.11	Public and Occupational Health and Safety—Transportation	4-108
4.3.6.1.12	Environmental Justice	4-108
4.3.6.1.13	Waste Management	4-109
4.3.6.1.14	Spent Nuclear Fuel Management	4-109
4.4	Alternative 2—Use Only Existing Operational Facilities	4-110
4.4.1	Alternative 2 (Use Only Existing Operational Facilities)—Option 1	4-111
4.4.1.1	Operations and Transportation	4-112
4.4.1.1.1	Land Resources	4-112
4.4.1.1.2	Noise	4-112
4.4.1.1.3	Air Quality	4-113
4.4.1.1.4	Water Resources	4-113
4.4.1.1.5	Geology and Soils	4-114
4.4.1.1.6	Ecological Resources	4-114
4.4.1.1.7	Cultural and Paleontological Resources	4-115
4.4.1.1.8	Socioeconomics	4-115
4.4.1.1.9	Public and Occupational Health and Safety—Normal Operations	4-115
4.4.1.1.10	Public and Occupational Health and Safety—Facility Accidents	4-118
4.4.1.1.11	Public and Occupational Health and Safety—Transportation	4-121
4.4.1.1.12	Environmental Justice	4-121
4.4.1.1.13	Waste Management	4-122
4.4.1.1.14	Spent Nuclear Fuel Management	4-122
4.4.1.2	Permanent Deactivation of FFTF	4-122
4.4.1.2.1	Land Resources	4-123
4.4.1.2.2	Noise	4-123
4.4.1.2.3	Air Quality	4-123
4.4.1.2.4	Water Resources	4-123
4.4.1.2.5	Geology and Soils	4-124
4.4.1.2.6	Ecological Resources	4-124
4.4.1.2.7	Cultural and Paleontological Resources	4-124
4.4.1.2.8	Socioeconomics	4-125
4.4.1.2.9	Public and Occupational Health and Safety—Normal Deactivation Activities	4-125

	4.4.1.2.10	Public and Occupational Health and Safety—Deactivation Accidents	4-126
	4.4.1.2.11	Public and Occupational Health and Safety—Transportation	4-128
	4.4.1.2.12	Environmental Justice	4-128
	4.4.1.2.13	Waste Management	4-128
	4.4.1.2.14	Spent Nuclear Fuel Management	4-128
4.4.2	Alternative 2 (Use Only Existing Operational Facilities)—Option 2		4-129
4.4.2.1	Operations and Transportation		4-129
	4.4.2.1.1	Land Resources	4-129
	4.4.2.1.2	Noise	4-129
	4.4.2.1.3	Air Quality	4-130
	4.4.2.1.4	Water Resources	4-131
	4.4.2.1.5	Geology and Soils	4-131
	4.4.2.1.6	Ecological Resources	4-131
	4.4.2.1.7	Cultural and Paleontological Resources	4-132
	4.4.2.1.8	Socioeconomics	4-132
	4.4.2.1.9	Public and Occupational Health and Safety—Normal Operations	4-132
	4.4.2.1.10	Public and Occupational Health and Safety—Facility Accidents	4-134
	4.4.2.1.11	Public and Occupational Health and Safety—Transportation	4-138
	4.4.2.1.12	Environmental Justice	4-139
	4.4.2.1.13	Waste Management	4-139
	4.4.2.1.14	Spent Nuclear Fuel Management	4-139
4.4.2.2	Permanent Deactivation of FFTF		4-140
4.4.3	Alternative 2 (Use Only Existing Operational Facilities)—Option 3		4-140
4.4.3.1	Operations and Transportation		4-140
	4.4.3.1.1	Land Resources	4-140
	4.4.3.1.2	Noise	4-140
	4.4.3.1.3	Air Quality	4-141
	4.4.3.1.4	Water Resources	4-142
	4.4.3.1.5	Geology and Soils	4-142
	4.4.3.1.6	Ecological Resources	4-143
	4.4.3.1.7	Cultural and Paleontological Resources	4-143
	4.4.3.1.8	Socioeconomics	4-144
	4.4.3.1.9	Public and Occupational Health and Safety—Normal Operations	4-144
	4.4.3.1.10	Public and Occupational Health and Safety—Facility Accidents	4-147
	4.4.3.1.11	Public and Occupational Health and Safety—Transportation	4-151
	4.4.3.1.12	Environmental Justice	4-152
	4.4.3.1.13	Waste Management	4-152
	4.4.3.1.14	Spent Nuclear Fuel Management	4-155
4.4.3.2	Permanent Deactivation of FFTF		4-155
4.4.4	Alternative 2 (Use Only Existing Operational Facilities)—Option 4		4-155
4.4.4.1	Operations and Transportation		4-156
	4.4.4.1.1	Land Resources	4-156

	4.4.4.1.2	Noise	4-156
	4.4.4.1.3	Air Quality	4-156
	4.4.4.1.4	Water Resources	4-156
	4.4.4.1.5	Geology and Soils	4-157
	4.4.4.1.6	Ecological Resources	4-157
	4.4.4.1.7	Cultural and Paleontological Resources	4-157
	4.4.4.1.8	Socioeconomics	4-157
	4.4.4.1.9	Public and Occupational Health and Safety—Normal Operations	4-157
	4.4.4.1.10	Public and Occupational Health and Safety—Facility Accidents	4-159
	4.4.4.1.11	Public and Occupational Health and Safety—Transportation	4-163
	4.4.4.1.12	Environmental Justice	4-164
	4.4.4.1.13	Waste Management	4-164
	4.4.4.1.14	Spent Nuclear Fuel Management	4-164
	4.4.4.2	Permanent Deactivation of FFTF	4-165
4.4.5	Alternative 2 (Use Only Existing Operational Facilities)—Option 5		4-165
	4.4.5.1	Operations and Transportation	4-165
	4.4.5.1.1	Land Resources	4-165
	4.4.5.1.2	Noise	4-165
	4.4.5.1.3	Air Quality	4-165
	4.4.5.1.4	Water Resources	4-166
	4.4.5.1.5	Geology and Soils	4-166
	4.4.5.1.6	Ecological Resources	4-166
	4.4.5.1.7	Cultural and Paleontological Resources	4-166
	4.4.5.1.8	Socioeconomics	4-166
	4.4.5.1.9	Public and Occupational Health and Safety—Normal Operations	4-167
	4.4.5.1.10	Public and Occupational Health and Safety—Facility Accidents	4-168
	4.4.5.1.11	Public and Occupational Health and Safety—Transportation	4-173
	4.4.5.1.12	Environmental Justice	4-174
	4.4.5.1.13	Waste Management	4-174
	4.4.5.1.14	Spent Nuclear Fuel Management	4-175
	4.4.5.2	Permanent Deactivation of FFTF	4-175
4.4.6	Alternative 2 (Use Only Existing Operational Facilities)—Option 6		4-175
	4.4.6.1	Operations and Transportation	4-175
	4.4.6.1.1	Land Resources	4-175
	4.4.6.1.2	Noise	4-175
	4.4.6.1.3	Air Quality	4-176
	4.4.6.1.4	Water Resources	4-176
	4.4.6.1.5	Geology and Soils	4-176
	4.4.6.1.6	Ecological Resources	4-176
	4.4.6.1.7	Cultural and Paleontological Resources	4-176
	4.4.6.1.8	Socioeconomics	4-177
	4.4.6.1.9	Public and Occupational Health and Safety—Normal Operations	4-177

	4.4.6.1.10	Public and Occupational Health and Safety—Facility Accidents	4-178
	4.4.6.1.11	Public and Occupational Health and Safety—Transportation	4-183
	4.4.6.1.12	Environmental Justice	4-184
	4.4.6.1.13	Waste Management	4-184
	4.4.6.1.14	Spent Nuclear Fuel Management	4-185
	4.4.6.2	Permanent Deactivation of FFTF	4-185
4.4.7	Alternative 2 (Use Only Existing Operational Facilities)—Option 7		4-185
	4.4.7.1	Operations and Transportation	4-185
	4.4.7.1.1	Land Resources	4-185
	4.4.7.1.2	Noise	4-186
	4.4.7.1.3	Air Quality	4-186
	4.4.7.1.4	Water Resources	4-186
	4.4.7.1.5	Geology and Soils	4-186
	4.4.7.1.6	Ecological Resources	4-187
	4.4.7.1.7	Cultural and Paleontological Resources	4-187
	4.4.7.1.8	Socioeconomics	4-188
	4.4.7.1.9	Public and Occupational Health and Safety—Normal Operations	4-188
	4.4.7.1.10	Public and Occupational Health and Safety—Facility Accidents	4-189
	4.4.7.1.11	Public and Occupational Health and Safety—Transportation	4-193
	4.4.7.1.12	Environmental Justice	4-193
	4.4.7.1.13	Waste Management	4-194
	4.4.7.1.14	Spent Nuclear Fuel Management	4-194
	4.4.7.2	Permanent Deactivation of FFTF	4-195
4.4.8	Alternative 2 (Use Only Existing Operational Facilities)—Option 8		4-195
	4.4.8.1	Operations and Transportation	4-195
	4.4.8.1.1	Land Resources	4-195
	4.4.8.1.2	Noise	4-195
	4.4.8.1.3	Air Quality	4-196
	4.4.8.1.4	Water Resources	4-196
	4.4.8.1.5	Geology and Soils	4-196
	4.4.8.1.6	Ecological Resources	4-196
	4.4.8.1.7	Cultural and Paleontological Resources	4-197
	4.4.8.1.8	Socioeconomics	4-197
	4.4.8.1.9	Public and Occupational Health and Safety—Normal Operations	4-197
	4.4.8.1.10	Public and Occupational Health and Safety—Facility Accidents	4-199
	4.4.8.1.11	Public and Occupational Health and Safety—Transportation	4-203
	4.4.8.1.12	Environmental Justice	4-204
	4.4.8.1.13	Waste Management	4-204
	4.4.8.1.14	Spent Nuclear Fuel Management	4-205
	4.4.8.2	Permanent Deactivation of FFTF	4-205
4.4.9	Alternative 2 (Use Only Existing Operational Facilities)—Option 9		4-205
	4.4.9.1	Operations and Transportation	4-205

	4.4.9.1.1	Land Resources	4-205
	4.4.9.1.2	Noise	4-206
	4.4.9.1.3	Air Quality	4-206
	4.4.9.1.4	Water Resources	4-206
	4.4.9.1.5	Geology and Soils	4-206
	4.4.9.1.6	Ecological Resources	4-207
	4.4.9.1.7	Cultural and Paleontological Resources	4-207
	4.4.9.1.8	Socioeconomics	4-207
	4.4.9.1.9	Public and Occupational Health and Safety—Normal Operations	4-207
	4.4.9.1.10	Public and Occupational Health and Safety—Facility Accidents	4-209
	4.4.9.1.11	Public and Occupational Health and Safety—Transportation	4-213
	4.4.9.1.12	Environmental Justice	4-214
	4.4.9.1.13	Waste Management	4-215
	4.4.9.1.14	Spent Nuclear Fuel Management	4-215
	4.4.9.2	Permanent Deactivation of FFTF	4-215
4.5	Alternative 3—Construct New Accelerator(s)		4-216
4.5.1	Alternative 3 (Construct New Accelerator[s])—Option 1		4-217
	4.5.1.1	Construction of the New Accelerator(s) and Support Facility	4-218
	4.5.1.1.1	Land Resources	4-218
	4.5.1.1.2	Noise	4-218
	4.5.1.1.3	Air Quality	4-219
	4.5.1.1.4	Water Resources	4-220
	4.5.1.1.5	Geology and Soils	4-221
	4.5.1.1.6	Ecological Resources	4-221
	4.5.1.1.7	Cultural and Paleontological Resources	4-222
	4.5.1.1.8	Socioeconomics	4-223
	4.5.1.1.9	Public and Occupational Health and Safety—Normal Construction Activities	4-223
	4.5.1.1.10	Public and Occupational Health and Safety—Construction Accidents	4-223
	4.5.1.1.11	Environmental Justice	4-223
	4.5.1.1.12	Waste Management	4-224
	4.5.1.2	Operations and Transportation	4-224
	4.5.1.2.1	Land Resources	4-224
	4.5.1.2.2	Noise	4-225
	4.5.1.2.3	Air Quality	4-226
	4.5.1.2.4	Water Resources	4-226
	4.5.1.2.5	Geology and Soils	4-228
	4.5.1.2.6	Ecological Resources	4-228
	4.5.1.2.7	Cultural and Paleontological Resources	4-229
	4.5.1.2.8	Socioeconomics	4-230
	4.5.1.2.9	Public and Occupational Health and Safety—Normal Operations	4-230
	4.5.1.2.10	Public and Occupational Health and Safety—Facility Accidents	4-233
	4.5.1.2.11	Public and Occupational Health and Safety—Transportation	4-235

	4.5.1.2.12	Environmental Justice	4-237
	4.5.1.2.13	Waste Management	4-237
4.5.1.3		Decontamination and Decommissioning of the Accelerator(s) and Support Facility	4-239
	4.5.1.3.1	Land Resources	4-239
	4.5.1.3.2	Noise	4-239
	4.5.1.3.3	Air Quality	4-240
	4.5.1.3.4	Water Resources	4-240
	4.5.1.3.5	Geology and Soils	4-240
	4.5.1.3.6	Ecological Resources	4-241
	4.5.1.3.7	Cultural and Paleontological Resources	4-241
	4.5.1.3.8	Socioeconomics	4-241
	4.5.1.3.9	Public and Occupational Health and Safety—Normal Decontamination and Decommissioning Activities	4-241
	4.5.1.3.10	Public and Occupational Health and Safety—Decontamination and Decommissioning Accidents ..	4-242
	4.5.1.3.11	Environmental Justice	4-242
	4.5.1.3.12	Waste Management	4-243
4.5.1.4		Permanent Deactivation of FFTF	4-243
4.5.2		Alternative 3 (Construct New Accelerator[s])—Option 2	4-243
4.5.2.1		Construction of the New Accelerator(s) and Support Facility	4-243
4.5.2.2		Operations and Transportation	4-243
	4.5.2.2.1	Land Resources	4-244
	4.5.2.2.2	Noise	4-244
	4.5.2.2.3	Air Quality	4-244
	4.5.2.2.4	Water Resources	4-244
	4.5.2.2.5	Geology and Soils	4-245
	4.5.2.2.6	Ecological Resources	4-245
	4.5.2.2.7	Cultural and Paleontological Resources	4-246
	4.5.2.2.8	Socioeconomics	4-246
	4.5.2.2.9	Public and Occupational Health and Safety—Normal Operations	4-246
	4.5.2.2.10	Public and Occupational Health and Safety—Facility Accidents	4-248
	4.5.2.2.11	Public and Occupational Health and Safety—Transportation	4-251
	4.5.2.2.12	Environmental Justice	4-252
	4.5.2.2.13	Waste Management	4-252
4.5.2.3		Decontamination and Decommissioning of the Accelerator(s) and Support Facility	4-253
4.5.2.4		Permanent Deactivation of FFTF	4-253
4.5.3		Alternative 3 (Construct New Accelerator[s])—Option 3	4-253
4.5.3.1		Construction of the New Accelerator(s) and Support Facility	4-253
4.5.3.2		Operations and Transportation	4-253
	4.5.3.2.1	Land Resources	4-253
	4.5.3.2.2	Noise	4-254
	4.5.3.2.3	Air Quality	4-254
	4.5.3.2.4	Water Resources	4-254
	4.5.3.2.5	Geology and Soils	4-255
	4.5.3.2.6	Ecological Resources	4-255

	4.5.3.2.7	Cultural and Paleontological Resources	4-256
	4.5.3.2.8	Socioeconomics	4-256
	4.5.3.2.9	Public and Occupational Health and Safety—Normal Operations	4-256
	4.5.3.2.10	Public and Occupational Health and Safety—Facility Accidents	4-258
	4.5.3.2.11	Public and Occupational Health and Safety—Transportation	4-261
	4.5.3.2.12	Environmental Justice	4-262
	4.5.3.2.13	Waste Management	4-262
	4.5.3.3	Decontamination and Decommissioning of the Accelerator(s) and Support Facility	4-263
	4.5.3.4	Permanent Deactivation of FFTF	4-263
4.6	Alternative 4—Construct New Research Reactor		4-264
4.6.1	Alternative 4 (Construct New Research Reactor)—Option 1		4-265
	4.6.1.1	Construction of the New Research Reactor and Support Facility	4-266
	4.6.1.1.1	Land Resources	4-266
	4.6.1.1.2	Noise	4-266
	4.6.1.1.3	Air Quality	4-267
	4.6.1.1.4	Water Resources	4-267
	4.6.1.1.5	Geology and Soils	4-268
	4.6.1.1.6	Ecological Resources	4-269
	4.6.1.1.7	Cultural and Paleontological Resources	4-270
	4.6.1.1.8	Socioeconomics	4-270
	4.6.1.1.9	Public and Occupational Health and Safety—Normal Construction Activities	4-270
	4.6.1.1.10	Public and Occupational Health and Safety—Construction Accidents	4-271
	4.6.1.1.11	Environmental Justice	4-271
	4.6.1.1.12	Waste Management	4-271
	4.6.1.2	Operations and Transportation	4-271
	4.6.1.2.1	Land Resources	4-271
	4.6.1.2.2	Noise	4-272
	4.6.1.2.3	Air Quality	4-273
	4.6.1.2.4	Water Resources	4-273
	4.6.1.2.5	Geology and Soils	4-274
	4.6.1.2.6	Ecological Resources	4-275
	4.6.1.2.7	Cultural and Paleontological Resources	4-276
	4.6.1.2.8	Socioeconomics	4-277
	4.6.1.2.9	Public and Occupational Health and Safety—Normal Operations	4-277
	4.6.1.2.10	Public and Occupational Health and Safety—Facility Accidents	4-279
	4.6.1.2.11	Public and Occupational Health and Safety—Transportation	4-282
	4.6.1.2.12	Environmental Justice	4-282
	4.6.1.2.13	Waste Management	4-283
	4.6.1.2.14	Spent Nuclear Fuel Management	4-285
4.6.1.3	Decontamination and Decommissioning of the Research Reactor and Support Facility		4-285

	4.6.1.3.1	Land Resources	4-285
	4.6.1.3.2	Noise	4-285
	4.6.1.3.3	Air Quality	4-286
	4.6.1.3.4	Water Resources	4-286
	4.6.1.3.5	Geology and Soils	4-286
	4.6.1.3.6	Ecological Resources	4-286
	4.6.1.3.7	Cultural and Paleontological Resources	4-286
	4.6.1.3.8	Socioeconomics	4-287
	4.6.1.3.9	Public and Occupational Health and Safety—Normal Decontamination and Decommissioning Activities	4-287
	4.6.1.3.10	Public and Occupational Health and Safety—Decontamination and Decommissioning Accidents	4-288
	4.6.1.3.11	Environmental Justice	4-289
	4.6.1.3.12	Waste Management	4-289
	4.6.1.3.13	Spent Nuclear Fuel Management	4-290
	4.6.1.4	Permanent Deactivation of FFTF	4-290
4.6.2	Alternative 4 (Construct New Research Reactor)—Option 2		4-290
	4.6.2.1	Construction of the New Research Reactor and Support Facility	4-290
	4.6.2.2	Operations and Transportation	4-290
	4.6.2.2.1	Land Resources	4-290
	4.6.2.2.2	Noise	4-291
	4.6.2.2.3	Air Quality	4-291
	4.6.2.2.4	Water Resources	4-291
	4.6.2.2.5	Geology and Soils	4-292
	4.6.2.2.6	Ecological Resources	4-292
	4.6.2.2.7	Cultural and Paleontological Resources	4-292
	4.6.2.2.8	Socioeconomics	4-293
	4.6.2.2.9	Public and Occupational Health and Safety—Normal Operations	4-293
	4.6.2.2.10	Public and Occupational Health and Safety—Facility Accidents	4-295
	4.6.2.2.11	Public and Occupational Health and Safety—Transportation	4-297
	4.6.2.2.12	Environmental Justice	4-298
	4.6.2.2.13	Waste Management	4-298
	4.6.2.2.14	Spent Nuclear Fuel Management	4-298
	4.6.2.3	Decontamination and Decommissioning of the Research Reactor and Support Facility	4-298
	4.6.2.4	Permanent Deactivation of FFTF	4-299
4.6.3	Alternative 4 (Construct New Research Reactor)—Option 3		4-299
	4.6.3.1	Construction of the New Research Reactor and Support Facility	4-299
	4.6.3.2	Operations and Transportation	4-299
	4.6.3.2.1	Land Resources	4-299
	4.6.3.2.2	Noise	4-300
	4.6.3.2.3	Air Quality	4-300
	4.6.3.2.4	Water Resources	4-300
	4.6.3.2.5	Geology and Soils	4-301
	4.6.3.2.6	Ecological Resources	4-301
	4.6.3.2.7	Cultural and Paleontological Resources	4-301
	4.6.3.2.8	Socioeconomics	4-302

	4.6.3.2.9	Public and Occupational Health and Safety—Normal Operations	4–302
	4.6.3.2.10	Public and Occupational Health and Safety—Facility Accidents	4–304
	4.6.3.2.11	Public and Occupational Health and Safety—Transportation	4–306
	4.6.3.2.12	Environmental Justice	4–307
	4.6.3.2.13	Waste Management	4–308
	4.6.3.2.14	Spent Nuclear Fuel Management	4–308
	4.6.3.3	Decontamination and Decommissioning of the Research Reactor and Support Facility	4–308
	4.6.3.4	Permanent Deactivation of FFTF	4–308
4.7		Alternative 5—Permanently Deactivate FFTF (with No New Missions)	4–309
4.8		Cumulative Impacts	4–310
	4.8.1	Cumulative Impacts at ORR	4–313
	4.8.1.1	Resource Requirements	4–313
	4.8.1.2	Air Quality	4–314
	4.8.1.3	Public and Occupational Health and Safety—Normal Operations	4–314
	4.8.1.4	Waste Management	4–315
	4.8.2	Cumulative Impacts at INEEL	4–315
	4.8.2.1	Resource Requirements	4–316
	4.8.2.2	Air Quality	4–317
	4.8.2.3	Public and Occupational Health and Safety—Normal Operations	4–318
	4.8.2.4	Waste Management	4–319
	4.8.3	Cumulative Impacts at Hanford	4–320
	4.8.3.1	Resource Requirements	4–320
	4.8.3.2	Air Quality	4–321
	4.8.3.3	Public and Occupational Health and Safety—Normal Operations	4–321
	4.8.3.4	Waste Management	4–323
	4.8.3.5	Spent Nuclear Fuel Management	4–324
	4.8.4	Cumulative Impacts at the Generic CLWR Site	4–325
	4.8.5	Cumulative Impacts at the New Accelerator(s) Generic DOE Site	4–325
	4.8.6	Cumulative Impacts at the New Research Reactor Generic DOE Site	4–325
	4.8.7	Cumulative Impacts of Transportation	4–325
4.9		Mitigation Measures	4–326
4.10		Unavoidable Adverse Environmental Impacts	4–327
4.11		Relationship Between Short-Term Use of the Environment and Long-Term Productivity ...	4–328
4.12		Irreversible and Irretrievable Commitments of Resources	4–329
4.13		Industrial Safety	4–330
4.14		References	4–331

Chapter 5

Applicable Laws, Regulations, and Other Requirements 5–1

5.1	Environmental, Safety, and Health Laws, Regulations, Executive Orders, and U.S. Department of Energy Orders	5–1
5.1.1	Federal Environmental, Safety, and Health Laws and Regulations	5–2
5.1.2	Environmental, Safety, and Health Executive Orders	5–12
5.1.3	DOE Environmental, Safety, and Health Regulations and Orders	5–14
5.1.4	State Environmental Laws, Regulations, and Agreements	5–16

5.2	Radioactive Material Packaging and Transportation Regulations	5-18
5.3	Emergency Management and Response Laws, Regulations, and Executive Orders	5-19
5.3.1	Emergency Management and Response Federal Laws	5-19
5.3.2	Emergency Management and Response Federal Regulations	5-20
5.3.3	Emergency Response and Management Executive Orders	5-20
5.4	Consultations with Federal, State, and Local Agencies and Federally Recognized Native American Groups	5-21
 Chapter 6		
	List of Preparers	6-1
 Chapter 7		
	Distribution List	7-1
 Chapter 8		
	Glossary	8-1
 Chapter 9		
	Index	9-1

List of Figures

Volume 1

Figure 2–1	Chemical Processing Flowsheet for Irradiated Neptunium-237 Target Processing	2–8
Figure 2–2	Fast Flux Test Facility	2–9
Figure 2–3	FFTF Complex	2–11
Figure 2–4	Cutaway of the Reactor Containment Building	2–12
Figure 2–5	Vertical Cross Section of the ATR Vessel	2–17
Figure 2–6	Plan View (Cross Section) of ATR	2–18
Figure 2–7	Typical Transuranic Isotope Production Target	2–20
Figure 2–8	Plan View (Cross Section) of HFIR	2–23
Figure 2–9	Plan View (Cross Section) of a Generic CLWR	2–25
Figure 2–10	CLWR Fuel Assembly	2–26
Figure 2–11	Accelerator Production of Plutonium Plant Layout	2–29
Figure 2–12	Representative Illustration of Fuel Rod; Neptunium-237, Medical, or Industrial Radioisotope Target Rod; and Control Rod (New Research Reactor)	2–32
Figure 2–13	Cross-Sectional View of Fuel Assemblies in the Core (New Research Reactor)	2–33
Figure 2–14	Cross-Sectional View of Research Reactor Core	2–35
Figure 2–15	REDC Building 7930 Second Floor Plan View (Cross Section)	2–37
Figure 2–16	Fluorinel Dissolution Process Facility, Plus 28-Foot Level	2–39
Figure 2–17	Plan View of FDPF Cell	2–41
Figure 2–18	FMEF Layout, Minus 35-Foot Level	2–44
Figure 2–19	RPL: Proposed First Floor Locations for Hot Cell Operations and Radiochemical and Radioanalytical Laboratories for FFTF Target Processing	2–46
Figure 2–20	RPL: Proposed Basement Locations for Assembly, Processing, and Storage of FFTF Targets; Also Shown: Laboratory with Radon Gas Capture System to be Used for Processing Radium-226 Targets	2–47
Figure 2–21	Building 306–E Floor Plan	2–49
Figure 2–22	Support Facility Layout	2–51
Figure 2–23	Public Risks Due to Radiological Accidents at Candidate Sites (35 Years)	2–74
Figure 2–24	Public Risks Due to Radiological Accidents at Candidate Facilities (35 Years)	2–74
Figure 2–25	Population Residing Within 16 Kilometers (10 Miles) of Candidate Fabrication and Processing Facilities	2–76
Figure 2–26	Annual Water Use Under the Nuclear Infrastructure Alternatives	2–81
Figure 2–27	Public Risks Due to Radiological Transportation Accidents (35 Years)	2–89

Figure 2–28	Radiological Risks to the Public Due to Incident-Free Transportation (35 Years)	2–90
Figure 2–29	Highway Distances That Would Be Traveled Under the Alternatives (35 Years)	2–90
Figure 2–30	Implementation Schedule for No Action Alternative	2–95
Figure 2–31	Implementation Schedule for Alternative 1	2–96
Figure 2–32	Implementation Schedule for Alternative 2	2–97
Figure 2–33	Implementation Schedule for Alternative 3	2–98
Figure 2–34	Implementation Schedule for Alternative 4	2–99
Figure 2–35	Implementation Schedule for Alternative 5	2–100
Figure 3–1	Generalized Land Use at Oak Ridge Reservation and Vicinity	3–5
Figure 3–2	Surface Water Features at Oak Ridge Reservation	3–11
Figure 3–3	Stratigraphic Column for the Oak Ridge Reservation	3–16
Figure 3–4	Geologic Cross Section of the Oak Ridge Reservation	3–17
Figure 3–5	Distribution of Plant Communities at the Oak Ridge Reservation	3–22
Figure 3–6	Generalized Land Use at Idaho National Engineering and Environmental Laboratory and Vicinity	3–44
Figure 3–7	Surface Water Features at the Idaho National Engineering and Environmental Laboratory	3–53
Figure 3–8	Extent of Tritium and Strontium-90 Plumes within the Snake River Plain Aquifer on the Idaho National Engineering and Environmental Laboratory (1995)	3–57
Figure 3–9	Lithologic Logs of Deep Drill Holes on Idaho National Engineering and Environmental Laboratory	3–61
Figure 3–10	Major Geologic Features of the Idaho National Engineering and Environmental Laboratory	3–62
Figure 3–11	Distribution of Plant Communities at Idaho National Engineering and Environmental Laboratory	3–65
Figure 3–12	Generalized Land Use at the Hanford Site and Vicinity	3–89
Figure 3–13	Surface Water Features at the Hanford Site	3–99
Figure 3–14	Flood Area for the Probable Maximum Flood and Columbia River 1948 Flood	3–103
Figure 3–15	Flood Area of a 50 Percent Breach of the Grand Coulee Dam	3–104
Figure 3–16	Stratigraphic Column for the Pasco Basin and Hanford Site	3–107
Figure 3–17	Geologic Cross Section of the Hanford Site	3–108
Figure 3–18	Average Tritium Concentrations on the Hanford Site, Top of Unconfined Aquifer . .	3–110
Figure 3–19	Average Iodine-129 Concentrations on the Hanford Site, Top of Unconfined Aquifer	3–111
Figure 3–20	Average Nitrate Concentrations on the Hanford Site, Top of Unconfined Aquifer . .	3–112

Figure 3–21	Distribution of Plant Communities at the Hanford Site	3–118	
Figure 3–22	Commercial Pressurized-Water Reactors Operating in the United States	3–143	

List of Tables

Volume 1

Table 1–1	Representative Radioisotopes	1–6
Table 2–1	NI PEIS Alternatives and Options	2–3
Table 2–2	Examples of HFIR-Produced Radioisotopes of Current Interest for Therapy	2–23
Table 2–3	Alternatives and Options Matrix	2–58
Table 2–4	Irradiation Facilities Considered but Dismissed from Further Evaluation	2–67
Table 2–5	Processing Facilities Considered but Dismissed from Further Evaluation	2–70
Table 2–6	Comparison Among Alternatives: Impacts on Occupational and Public Health and Safety from Baseline Conditions	2–72
Table 2–7	Comparison of Waste and Spent Nuclear Fuel Generation Among Alternatives	2–78
Table 2–8	Air Pollutant Concentrations Resulting from Construction of a High-Energy Accelerator Under All Options of Alternative 3	2–81
Table 2–9	Air Pollutant Concentrations Resulting from Construction of a New Research Reactor Under All Options of Alternative 4	2–82
Table 2–10	Air Pollutant Concentrations Expected from Operation of the Radiochemical Engineering Development Center Under Alternatives 1 Through 4	2–83
Table 2–11	Air Pollutant Concentrations Expected from Operation of the Fluorinel Dissolution Process Facility Under Alternatives 1 Through 4	2–83
Table 2–12	Comparison Among Alternatives: Impacts on Criteria Air Pollutants at the Hanford Site	2–84
Table 2–13	Air Pollutant Concentrations Expected from Operation of the Emergency Diesel Generators for the High-Energy Accelerator	2–85
Table 2–14	Air Pollutant Concentrations Expected from Operation of the Emergency Diesel Generator for the New Research Reactor	2–86
Table 2–15	Comparisons Among Alternatives: Change in Direct Jobs Under the Nuclear Infrastructure Alternatives	2–87
Table 2–16	Comparison Among Alternatives: Impacts of Transportation on Occupational and Public Health and Safety	2–88
Table 2–17	Average Occupational Total Recordable Cases and Fatality Rates	2–94
Table 2–18	Industrial Safety Impacts from Construction and Operation	2–94
Table 2–19	Medical Isotopes and Their Means of Production	2–101

Table 3–1	General Regions of Influence for the Affected Environment	3–2
Table 3–2	Comparison of Modeled Ambient Air Concentrations from Oak Ridge Reservation Sources with Most Stringent Applicable Standards or Guidelines, 1998	3–8
Table 3–3	Comparison of Modeled Ambient Air Concentrations from Sources at HFIR and REDC with Most Stringent Applicable Standards or Guidelines	3–10
Table 3–4	The Modified Mercalli Intensity Scale of 1931, with Approximate Correlations to Richter Scale and Maximum Ground Acceleration	3–19
Table 3–5	Distribution of Employees by Place of Residence in the ORR Region of Influence, 1998	3–27
Table 3–6	Sources of Radiation Exposure to Individuals in the ORR Vicinity Unrelated to ORR Operations	3–29
Table 3–7	Radiation Doses to the Public from ORR Normal Operations in 1998	3–29
Table 3–8	Radiation Doses to Workers from ORR Normal Operations in 1998	3–30
Table 3–9	Radiation Doses to the Public from Normal Operations at HFIR and REDC in 1999	3–31
Table 3–10	Radiation Doses to Workers from HFIR and REDC Normal Operations	3–31
Table 3–11	Waste Generation Rates and Inventories at ORR and ORNL	3–35
Table 3–12	Waste Generation Rates at HFIR and REDC	3–35
Table 3–13	Waste Management Capabilities at ORR	3–36
Table 3–14	Waste Management PEIS Records of Decision Affecting ORR	3–42
Table 3–15	Comparison of Modeled Ambient Air Concentrations from INEEL Sources with Most Stringent Applicable Standards or Guidelines	3–49
Table 3–16	Prevention of Significant Deterioration Increment Consumption at Craters of the Moon Wilderness (Class I) Area by Existing (1996) and Projected Sources Subject to Prevention of Significant Deterioration Regulation	3–50
Table 3–17	Prevention of Significant Deterioration Increment Consumption at Class II Areas by Existing (1996) and Projected Sources Subject to Prevention of Significant Deterioration Regulation at INEEL	3–50
Table 3–18	Comparison of Modeled Ambient Air Concentrations from ATR Sources with Most Stringent Applicable Standards or Guidelines	3–51
Table 3–19	Distribution of Employees by Place of Residence in the INEEL Region of Influence, 1997	3–72
Table 3–20	Sources of Radiation Exposure to Individuals in the INEEL Vicinity Unrelated to INEEL Operations	3–75
Table 3–21	Radiation Doses to the Public from INEEL Normal Operations in 1998	3–75
Table 3–22	Radiation Doses to Workers from INEEL Normal Operations in 1998	3–76
Table 3–23	Radiation Doses to the Public from Normal Operations at ATR and ATR Critical Facility in 1999	3–77

	Table 3–24	Radiation Doses to Workers from the Test Reactor Area and ATR Normal Operations in 1998	3–77
	Table 3–25	Waste Generation Rates and Inventories at INEEL	3–80
	Table 3–26	Waste Generation Rates at ATR and FDPF	3–81
	Table 3–27	Waste Management Capabilities at INEEL	3–81
	Table 3–28	Waste Management PEIS Records of Decision Affecting INEEL	3–87
	Table 3–29	Comparison of Modeled Ambient Air Concentrations from Hanford Sources with Most Stringent Applicable Standards or Guidelines	3–97
	Table 3–30	Distribution of Employees by Place of Residence in the Hanford Region of Influence, 1997	3–127
	Table 3–31	Sources of Radiation Exposure to Individuals in the Hanford Vicinity Unrelated to Hanford Operations	3–129
	Table 3–32	Radiation Doses to the Public from Hanford Normal Operations in 1998	3–130
	Table 3–33	Radiation Doses to Workers from Hanford Normal Operations in 1998	3–130
	Table 3–34	Waste Generation Rates and Inventories at Hanford	3–136
	Table 3–35	Waste Generation Rates at FFTF and RPL/306–E	3–136
	Table 3–36	Waste Management Capabilities at Hanford	3–137
	Table 3–37	Waste Management PEIS Records of Decision Affecting Hanford	3–141
	Table 3–38	Comparison of Baseline Air Concentrations with Most Stringent Applicable Regulations or Guidelines at the Generic CLWR Site	3–145
	Table 3–39	Sources of Radiation Exposure to Individuals in the Vicinity Unrelated to Operation at the CLWR Site	3–150
	Table 3–40	Radiation Doses to the Public from Normal Operation in 1994 at the Generic Existing CLWR Site	3–150
	Table 3–41	Annual Doses to Workers from Normal Operation at the Generic CLWR Site	3–151
	Table 3–42	Existing Pressurized-Light Water Reactor Site Waste Management Characteristics	3–153
	Table 3–43	Comparison of Baseline Ambient Air Concentrations with NAAQS at a Generic DOE Site	3–157
	Table 3–44	Sources of Radiation Exposure to Individuals in the Vicinity Unrelated to Operation at the Accelerator(s) or Reactor Site	3–161
	Table 3–45	Radiation Doses to the Public from Normal Operation at the Accelerator(s) or Reactor Site	3–162
	Table 3–46	Annual Doses to Workers from Normal Operation at the Accelerator(s) or Reactor Site	3–162
	Table 4–1	Water Use and Wastewater Generation Associated with Maintaining FFTF in Standby Under All Options of the No Action Alternative	4–5

Table 4-2	Radiological Impacts on the Public Around Hanford from Maintaining FFTF in Standby Under All Options of the No Action Alternative	4-8
Table 4-3	Radiological Impacts on FFTF Workers from Maintaining FFTF in Standby Under All Options of the No Action Alternative	4-9
Table 4-4	FFTF Standby Accident Consequences Under All Options of the No Action Alternative	4-10
Table 4-5	FFTF Standby Accident Risks Under All Options of the No Action Alternative	4-10
Table 4-6	Waste Management Impacts of Maintaining FFTF in Standby Under All Options of the No Action Alternative	4-11
Table 4-7	Radiological Impacts on the Public Around ORR from Storage in REDC Under Option 2 of the No Action Alternative	4-16
Table 4-8	Radiological Impacts on ORR Workers from Operational Facilities Under Option 2 of the No Action Alternative	4-17
Table 4-9	Radiological Impacts on the Public Around INEEL from Operational Facilities Under Option 3 of the No Action Alternative	4-22
Table 4-10	Radiological Impacts on INEEL Workers from Operational Facilities Under Option 3 of the No Action Alternative	4-23
Table 4-11	Radiological Impacts on the Public Around Hanford from Operational Facilities Under Option 4 of the No Action Alternative	4-28
Table 4-12	Radiological Impacts on Hanford Workers from Operational Facilities Under Option 4 of the No Action Alternative	4-28
Table 4-13	Incremental Hanford Concentrations Associated with Alternative 1 (Restart FFTF)—Option 1	4-35
Table 4-14	PSD Class II Increments Compared to Hanford Concentrations Associated with FFTF Under Alternative 1 (Restart FFTF)—Option 1	4-35
Table 4-15	Incremental ORR Concentrations Associated with Alternative 1 (Restart FFTF)—Option 1	4-35
Table 4-16	Incremental Water Use and Wastewater Generation Associated with Operating FFTF and RPL/306-E at Hanford and REDC at ORR Under Alternative 1 (Restart FFTF)—Option 1	4-36
Table 4-17	Incremental Radiological Impacts on the Public Around ORR and Hanford from Operational Facilities Under Alternative 1 (Restart FFTF)—Option 1	4-42
Table 4-18	Incremental Radiological Impacts on Involved REDC, FFTF, and RPL Workers Under Alternative 1 (Restart FFTF)—Option 1	4-43
Table 4-19	Incremental Hazardous Chemical Impacts Associated with FFTF Emergency Diesel Generators at Hanford Under Alternative 1 (Restart FFTF)—Option 1	4-43
Table 4-20	Incremental Hazardous Chemical Impacts on the Public Around ORR Under Alternative 1 (Restart FFTF)—Option 1	4-44
Table 4-21	FFTF, REDC, and RPL Accident Consequences Under Alternative 1 (Restart FFTF)—Option 1	4-46

Table 4-22	FFTF, REDC, and RPL Accident Risks Under Alternative 1 (Restart FFTF)—Option 1	4-47
Table 4-23	Incremental Waste Management Impacts of Operating FFTF and RPL/306-E at Hanford Under Alternative 1 (Restart FFTF)—Option 1	4-50
Table 4-24	Incremental Waste Management Impacts of Operating REDC at ORR Under Alternative 1 (Restart FFTF)—Option 1	4-51
Table 4-25	Data for Spent Nuclear Fuel Generation and Storage Under All Options of Alternative 1 (Restart FFTF)	4-55
Table 4-26	Environmental Impact of Dry Spent Nuclear Fuel Storage System Under All Options of Alternative 1 (Restart FFTF)	4-57
Table 4-27	Incremental INEEL Concentrations Associated with Alternative 1 (Restart FFTF)—Option 2	4-59
Table 4-28	PSD Class II Increments Compared to INEEL Concentrations Associated with Alternative 1 (Restart FFTF)—Option 2	4-59
Table 4-29	Incremental Water Use and Wastewater Generation Associated with Operating FDPF at INEEL Under Alternative 1 (Restart FFTF)—Option 2	4-60
Table 4-30	Incremental Radiological Impacts on the Public Around INEEL and Hanford from Operational Facilities Under Alternative 1 (Restart FFTF)—Option 2	4-63
Table 4-31	Incremental Radiological Impacts on Involved FDPF, FFTF, and RPL Workers Under Alternative 1 (Restart FFTF)—Option 2	4-64
Table 4-32	Incremental Hazardous Chemical Impacts on the Public Around INEEL Under Alternative 1 (Restart FFTF)—Option 2	4-65
Table 4-33	FFTF, RPL, and FDPF Accident Consequences Under Alternative 1 (Restart FFTF)—Option 2	4-66
Table 4-34	FFTF, RPL, and FDPF Accident Risks Under Alternative 1 (Restart FFTF)—Option 2	4-67
Table 4-35	ERPG Distances for Nitric Acid Releases at FDPF	4-68
Table 4-36	FDPF Hazardous Chemical Accident Impacts Under Alternative 1 (Restart FFTF)—Option 2	4-69
Table 4-37	Incremental Waste Management Impacts of Operating FDPF at INEEL Under Alternative 1 (Restart FFTF)—Option 2	4-72
Table 4-38	Incremental Hanford Concentrations Associated with Alternative 1 (Restart FFTF)—Option 3	4-76
Table 4-39	PSD Class II Increments Compared to Hanford Concentrations Associated with FMEF Under Alternative 1 (Restart FFTF)—Option 3	4-76
Table 4-40	Incremental Water Use and Wastewater Generation Associated with Operating FFTF and FMEF at Hanford Under Alternative 1 (Restart FFTF)—Option 3	4-77
Table 4-41	Incremental Radiological Impacts on the Public Around Hanford from Operational Facilities Under Alternative 1 (Restart FFTF)—Option 3	4-79

Table 4-42	Incremental Radiological Impacts on Involved FFTF and FMEF Workers Under Alternative 1 (Restart FFTF)—Option 3	4-80
Table 4-43	Incremental Hazardous Chemical Impacts on the Public at Hanford Under Alternative 1 (Restart FFTF)—Option 3	4-81
Table 4-44	FFTF and FMEF Accident Consequences Under Alternative 1 (Restart FFTF)—Option 3	4-82
Table 4-45	FFTF and FMEF Accident Risks Under Alternative 1 (Restart FFTF)—Option 3	4-83
Table 4-46	ERPG Distances for Nitric Acid Releases at FMEF	4-84
Table 4-47	FMEF Hazardous Chemical Accident Impacts Under Alternative 1 (Restart FFTF)—Option 3	4-85
Table 4-48	Incremental Waste Management Impacts of Operating FFTF and FMEF at Hanford Under Alternative 1 (Restart FFTF)—Option 3	4-88
Table 4-49	FFTF, REDC, and RPL Accident Consequences Under Alternative 1 (Restart FFTF)—Option 4	4-94
Table 4-50	FFTF, REDC, and RPL Accident Risks Under Alternative 1 (Restart FFTF)—Option 4	4-95
Table 4-51	FFTF, FDPF, and RPL Accident Consequences Under Alternative 1 (Restart FFTF)—Option 5	4-100
Table 4-52	FFTF, FDPF, and RPL Accident Risks Under Alternative 1 (Restart FFTF)—Option 5	4-101
Table 4-53	FFTF and FMEF Accident Consequences Under Alternative 1 (Restart FFTF)—Option 6	4-106
Table 4-54	FFTF and FMEF Accident Risks Under Alternative 1 (Restart FFTF)—Option 6	4-107
Table 4-55	Incremental ORR Concentrations Associated with Alternative 2 (Use Only Existing Operational Facilities)—Option 1	4-113
Table 4-56	Incremental Radiological Impacts on the Public Around INEEL and ORR from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 1	4-116
Table 4-57	Incremental Radiological Impacts on Involved INEEL and ORR Workers from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 1	4-117
Table 4-58	Incremental Hazardous Chemical Impacts on the Public Around ORR Under Alternative 2 (Use Only Existing Operational Facilities)—Option 1	4-117
Table 4-59	ATR and REDC Accident Consequences Under Alternative 2 (Use Only Existing Operational Facilities)—Option 1	4-119
Table 4-60	ATR and REDC Accident Risks Under Alternative 2 (Use Only Existing Operational Facilities)—Option 1	4-120
Table 4-61	Incremental Hanford Concentrations Associated with All Options of Alternatives 2 through 5	4-124

Table 4-62	Incremental Radiological Impacts on the Public Around Hanford from FFTF Deactivation Activities	4-126
Table 4-63	Incremental Radiological Impacts on Involved FFTF Workers from Deactivation Activities	4-126
Table 4-64	Consequences of FFTF Deactivation Accident	4-127
Table 4-65	Risks of FFTF Deactivation Accident	4-127
Table 4-66	Incremental INEEL Concentrations Associated with Alternative 2 (Use Only Existing Operational Facilities)—Option 2	4-130
Table 4-67	PSD Class II Increments Compared to INEEL Concentrations Associated with Alternative 2 (Use Only Existing Operational Facilities)—Option 2	4-130
Table 4-68	Incremental Radiological Impacts on the Public Around INEEL from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 2	4-133
Table 4-69	Incremental Radiological Impacts on Involved INEEL Workers from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 2	4-133
Table 4-70	Incremental Hazardous Chemical Impacts on the Public Around INEEL Under Alternative 2 (Use Only Existing Operational Facilities)—Option 2	4-134
Table 4-71	ATR and FDPF Accident Consequences Under Alternative 2 (Use Only Existing Operational Facilities)—Option 2	4-135
Table 4-72	ATR and FDPF Accident Risks Under Alternative 2 (Use Only Existing Operational Facilities)—Option 2	4-136
Table 4-73	ERPG Distances for Nitric Acid Releases at FDPF Under Alternative 2 (Use Only Existing Operational Facilities)—Option 2	4-137
Table 4-74	FDPF Hazardous Chemical Accident Impacts Under Alternative 2 (Use Only Existing Operational Facilities)—Option 2	4-138
Table 4-75	Incremental Hanford Concentrations Associated with Alternative 2 (Use Only Existing Operational Facilities)—Option 3	4-141
Table 4-76	PSD Class II Increments Compared to Hanford Concentrations Associated with Alternative 2 (Use Only Existing Operational Facilities)—Option 3	4-141
Table 4-77	Incremental Radiological Impacts on the Public Around INEEL and Hanford from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 3	4-145
Table 4-78	Incremental Radiological Impacts on Involved INEEL and Hanford Workers from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 3	4-146
Table 4-79	Incremental Hazardous Chemical Impacts on the Public Around Hanford Under Alternative 2 (Use Only Existing Operational Facilities)—Option 3	4-146
Table 4-80	ATR and FMEF Accident Consequences Under Alternative 2 (Use Only Existing Operational Facilities)—Option 3	4-148

Table 4-81	ATR and FMEF Accident Risks Under Alternative 2 (Use Only Existing Operational Facilities)—Option 3	4-149
Table 4-82	ERPG Distances for Nitric Acid Releases at FDPF Under Alternative 2 (Use Only Existing Operational Facilities)—Option 3	4-150
Table 4-83	FMEF Hazardous Chemical Accident Impacts Under Alternative 2 (Use Only Existing Operational Facilities)—Option 3	4-151
Table 4-84	Incremental Waste Management Impacts of Operating FMEF at Hanford Under Alternative 2 (Use Only Existing Operational Facilities)—Option 3	4-153
Table 4-85	Incremental Radiological Impacts on the Public Around the Generic CLWR Site and ORR from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 4	4-158
Table 4-86	Incremental Radiological Impacts on Involved CLWR and ORR Workers from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 4	4-159
Table 4-87	Generic CLWR and REDC Accident Consequences Under Alternative 2 (Use Only Existing Operational Facilities)—Option 4	4-161
Table 4-88	Generic CLWR and REDC Accident Risks Under Alternative 2 (Use Only Existing Operational Facilities)—Option 4	4-162
Table 4-89	Generic CLWR Early Fatalities and Risks Under Alternative 2 (Use Only Existing Operational Facilities)—Option 4	4-163
Table 4-90	Incremental Radiological Impacts on the Public Around the Generic CLWR Site and INEEL from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 5	4-167
Table 4-91	Incremental Radiological Impacts on Involved CLWR and INEEL Workers from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 5	4-168
Table 4-92	Generic CLWR and FDPF Accident Consequences Under Alternative 2 (Use Only Existing Operational Facilities)—Option 5	4-170
Table 4-93	Generic CLWR and FDPF Accident Risks Under Alternative 2 (Use Only Existing Operational Facilities)—Option 5	4-171
Table 4-94	Generic CLWR Early Fatalities and Risks Under Alternative 2 (Use Only Existing Operational Facilities)—Option 5	4-172
Table 4-95	ERPG Distances for Nitric Acid Releases at FDPF Under Alternative 2 (Use Only Existing Operational Facilities)—Option 5	4-172
Table 4-96	FDPF Hazardous Chemical Accident Impacts Under Alternative 2 (Use Only Existing Operational Facilities)—Option 5	4-173
Table 4-97	Incremental Radiological Impacts on the Public Around the Generic CLWR Site and Hanford from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 6	4-177

Table 4-98	Incremental Radiological Impacts on Involved CLWR and Hanford Workers from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 6	4-178
Table 4-99	Generic CLWR and FMEF Accident Consequences Under Alternative 2 (Use Only Existing Operational Facilities)—Option 6	4-180
Table 4-100	Generic CLWR and FMEF Accident Risks Under Alternative 2 (Use Only Existing Operational Facilities)—Option 6	4-181
Table 4-101	Generic CLWR Early Fatalities and Risks Under Alternative 2 (Use Only Existing Operational Facilities)—Option 6	4-182
Table 4-102	ERPG Distances for Nitric Acid Releases at FMEF Under Alternative 2 (Use Only Existing Operational Facilities)—Option 6	4-182
Table 4-103	FMEF Hazardous Chemical Accident Impacts Under Alternative 2 (Use Only Existing Operational Facilities)—Option 6	4-183
Table 4-104	Incremental Radiological Impacts on the Public Around INEEL and ORR from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 7	4-188
Table 4-105	Incremental Radiological Impacts on Involved INEEL and ORR Workers from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 7	4-189
Table 4-106	ATR, HFIR, and REDC Accident Consequences Under Alternative 2 (Use Only Existing Operational Facilities)—Option 7	4-191
Table 4-107	ATR, HFIR, and REDC Accident Risks Under Alternative 2 (Use Only Existing Operational Facilities)—Option 7	4-192
Table 4-108	Incremental Radiological Impacts on the Public Around ORR and INEEL from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 8	4-198
Table 4-109	Incremental Radiological Impacts on Involved ORR and INEEL Workers from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 8	4-198
Table 4-110	ATR, HFIR, and FDPF Accident Consequences Under Alternative 2 (Use Only Existing Operational Facilities)—Option 8	4-200
Table 4-111	ATR, HFIR, and FDPF Accident Risks Under Alternative 2 (Use Only Existing Operational Facilities)—Option 8	4-201
Table 4-112	ERPG Distances for Nitric Acid Releases at FDPF Under Alternative 2 (Use Only Existing Operational Facilities)—Option 8	4-202
Table 4-113	FDPF Hazardous Chemical Accident Impacts Under Alternative 2 (Use Only Existing Operational Facilities)—Option 8	4-203
Table 4-114	Incremental Radiological Impacts on the Public Around INEEL, ORR, and Hanford from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 9	4-208

Table 4–115	Incremental Radiological Impacts on Involved INEEL, ORR, and Hanford Workers from Operational Facilities Under Alternative 2 (Use Only Existing Operational Facilities)—Option 9	4–209
Table 4–116	ATR, HFIR, and FMEF Accident Consequences Under Alternative 2 (Use Only Existing Operational Facilities)—Option 9	4–210
Table 4–117	ATR, HFIR, and FMEF Accident Risks Under Alternative 2 (Use Only Existing Operational Facilities)—Option 9	4–211
Table 4–118	ERPG Distances for Nitric Acid Releases at FMEF Under Alternative 2 (Use Only Existing Operational Facilities)—Option 9	4–212
Table 4–119	FMEF Hazardous Chemical Accident Impacts Under Alternative 2 (Use Only Existing Operational Facilities)—Option 9	4–213
Table 4–120	Incremental Concentrations Associated with High-Energy Accelerator Construction Under All Options of Alternative 3 (Construct New Accelerator[s])	4–219
Table 4–121	Estimated Water Use and Wastewater Generation Associated with Constructing New Accelerator(s) and Support Facility Under All Options of Alternative 3 (Construct New Accelerator[s])	4–220
Table 4–122	Estimated Waste Generation Associated with Constructing New Accelerator(s) and Support Facility Under All Options of Alternative 3 (Construct New Accelerator[s])	4–224
Table 4–123	Incremental Concentrations Associated with High-Energy Accelerator Operation Under Alternative 3 (Construct New Accelerator[s])—Option 1	4–226
Table 4–124	Estimated Water Use and Wastewater Generation Associated with Operating Accelerator(s) and Support Facility Under Alternative 3 (Construct New Accelerator[s])—Option 1	4–227
Table 4–125	Incremental Radiological Impacts on the Public Around the Generic DOE Site and ORR from Operational Facilities Under Alternative 3 (Construct New Accelerator[s])—Option 1	4–231
Table 4–126	Incremental Radiological Impacts on Involved Workers at the Generic DOE Site and ORR from Operational Facilities Under Alternative 3 (Construct New Accelerator[s])—Option 1	4–232
Table 4–127	Incremental Hazardous Chemical Impacts on the Public Around a Generic Site from High-Energy Accelerator Operation Under Alternative 3 (Construct New Accelerator[s])—Option 1	4–233
Table 4–128	New Accelerator(s), Support Facility, and REDC Accident Consequences Under Alternative 3 (Construct New Accelerator[s])—Option 1	4–234
Table 4–129	New Accelerator(s), Support Facility, and REDC Accident Risks Under Alternative 3 (Construct New Accelerator[s])—Option 1	4–235
Table 4–130	Estimated Waste Generation Rates of Operating New Accelerator(s) and Support Facility Under Alternative 3 (Construct New Accelerator[s])—Option 1	4–238
Table 4–131	Incremental Radiological Impacts on Involved Workers at the Generic DOE Site from Accelerator(s) and Support Facility Decontamination and Decommissioning Activities Under All Options of Alternative 3 (Construct New Accelerator[s])	4–242

Table 4-132	Incremental Radiological Impacts on the Public Around the Generic DOE Site and INEEL from Operational Facilities Under Alternative 3 (Construct New Accelerator[s])—Option 2	4-247
Table 4-133	Incremental Radiological Impacts on Involved Workers at the Generic DOE Site and INEEL from Operational Facilities Under Alternative 3 (Construct New Accelerator[s])—Option 2	4-248
Table 4-134	New Accelerator(s), Support Facility, and FDPF Accident Consequences Under Alternative 3 (Construct New Accelerator[s])—Option 2	4-249
Table 4-135	New Accelerator(s), Support Facility, and FDPF Accident Risks Under Alternative 3 (Construct New Accelerator[s])—Option 2	4-250
Table 4-136	Incremental Radiological Impacts on the Public Around the Generic DOE Site and Hanford from Operational Facilities Under Alternative 3 (Construct New Accelerator[s])—Option 3	4-257
Table 4-137	Incremental Radiological Impacts on Involved Workers at the Generic DOE Site and Hanford from Operational Facilities Under Alternative 3 (Construct New Accelerator[s])—Option 3	4-258
Table 4-138	New Accelerator(s), Support Facility, and FMEF Accident Consequences Under Alternative 3 (Construct New Accelerator[s])—Option 3	4-259
Table 4-139	New Accelerator(s), Support Facility, and FMEF Accident Risks Under Alternative 3 (Construct New Accelerator[s])—Option 3	4-260
Table 4-140	Incremental Concentrations Associated with Research Reactor Construction Under All Options of Alternative 4 (Construct New Research Reactor)	4-267
Table 4-141	Estimated Water Use and Wastewater Generation Associated with Constructing a New Research Reactor and Support Facility Under All Options of Alternative 4 (Construct New Research Reactor)	4-268
Table 4-142	Estimated Waste Generation Associated with Constructing a New Research Reactor and Support Facility Under All Options of Alternative 4 (Construct New Research Reactor)	4-272
Table 4-143	Incremental Concentrations Associated with Research Reactor Operation Under Alternative 4 (Construct New Research Reactor)—Option 1	4-273
Table 4-144	Estimated Water Use and Wastewater Generation Associated with Operating a New Research Reactor and Support Facility Under Alternative 4 (Construct New Research Reactor)—Option 1	4-274
Table 4-145	Incremental Radiological Impacts on the Public Around the Generic DOE Site and ORR from Operational Facilities Under Alternative 4 (Construct New Research Reactor)—Option 1	4-278
Table 4-146	Incremental Radiological Impacts on Involved Workers at the Generic DOE Site and ORR from Operational Facilities Under Alternative 4 (Construct New Research Reactor)—Option 1	4-278
Table 4-147	Incremental Hazardous Chemical Impacts from New Research Reactor Diesel Generator Operation Under Alternative 4 (Construct New Research Reactor)—Option 1	4-279

Table 4–148	New Research Reactor, Support Facility, and REDC Accident Consequences Under Alternative 4 (Construct New Research Reactor)—Option 1	4–280
Table 4–149	New Research Reactor, Support Facility, and REDC Accident Risks Under Alternative 4 (Construct New Research Reactor)—Option 1	4–281
Table 4–150	Estimated Waste Generation Rates of Operating a New Research Reactor and Support Facility Under Alternative 4 (Construct New Research Reactor)—Option 1	4–283
Table 4–151	Incremental Radiological Impacts on Involved Workers at the Generic DOE Site from the Research Reactor and Support Facility Decontamination and Decommissioning Activities Under All Options of Alternative 4 (Construct New Research Reactor)	4–288
Table 4–152	Research Reactor and Support Facility Decontamination and Decommissioning Accident Consequences Under All Options of Alternative 4 (Construct New Research Reactor)	4–288
Table 4–153	Research Reactor and Support Facility Decontamination and Decommissioning Accident Risks Under All Options of Alternative 4 (Construct New Research Reactor)	4–289
Table 4–154	Incremental Radiological Impacts on the Public Around the Generic DOE Site and INEEL from Operational Facilities Under Alternative 4 (Construct New Research Reactor)—Option 2	4–294
Table 4–155	Incremental Radiological Impacts on Involved Workers at the Generic DOE Site and INEEL from Operational Facilities Under Alternative 4 (Construct New Research Reactor)—Option 2	4–294
Table 4–156	New Research Reactor, Support Facility, and FDPF Accident Consequences Under Alternative 4 (Construct New Research Reactor)—Option 2	4–295
Table 4–157	New Research Reactor, Support Facility, and FDPF Accident Risks Under Alternative 4 (Construct New Research Reactor)—Option 2	4–296
Table 4–158	Incremental Radiological Impacts on the Public Around the Generic DOE Site and Hanford from Operational Facilities Under Alternative 4 (Construct New Research Reactor)—Option 3	4–303
Table 4–159	Incremental Radiological Impacts on Involved Workers at the Generic DOE Site and Hanford from Operational Facilities Under Alternative 4 (Construct New Research Reactor)—Option 3	4–303
Table 4–160	New Research Reactor, Support Facility, and FMEF Accident Consequences Under Alternative 4 (Construct New Research Reactor)—Option 3	4–305
Table 4–161	New Research Reactor, Support Facility, and FMEF Accident Risks Under Alternative 4 (Construct New Research Reactor)—Option 3	4–306
Table 4–162	Other Present and Reasonably Foreseeable Actions Considered in the Cumulative Impact Assessment	4–312
Table 4–163	Maximum Cumulative Resource Use and Impacts at ORR	4–313
Table 4–164	Maximum Cumulative Air Pollutant Concentrations at ORR for Comparison with Ambient Air Quality Standards	4–314

Table 4–165	Maximum Cumulative Radiation Impacts at ORR	4–315
Table 4–166	Cumulative Impacts on Waste Management Activities at ORR Over 35-Year Period	4–316
Table 4–167	Maximum Cumulative Resource Use and Impacts at INEEL	4–317
Table 4–168	Maximum Cumulative Air Pollutant Concentrations at INEEL for Comparison with Ambient Air Quality Standards	4–318
Table 4–169	Maximum Cumulative Radiation Impacts at INEEL	4–319
Table 4–170	Cumulative Impacts on Waste Management Activities at INEEL Over 35-Year Period	4–320
Table 4–171	Maximum Cumulative Resource Use and Impacts at Hanford	4–321
Table 4–172	Maximum Cumulative Air Pollutant Concentrations at Hanford for Comparison with Ambient Air Quality Standards	4–322
Table 4–173	Maximum Cumulative Radiation Impacts at Hanford	4–323
Table 4–174	Cumulative Impacts on Waste Management Activities at Hanford Over 35-Year Period	4–324
Table 4–175	Average Occupational Total Recordable Cases and Fatality Rates	4–330
Table 4–176	Industrial Safety Impacts from Construction and Operation	4–330
Table 5–1	Relevant DOE Orders (as of October 26, 2000)	5–15
Table 5–2	State Environmental Laws, Regulations, and Agreements	5–16
Table 5–3	Organizations Contacted During the Consultation Process	5–22

List of Acronyms

AAA	Advanced Accelerator Applications	
ALARA	as low as is reasonably achievable	
ALOHA	Area Locations of Hazardous Atmospheres	
ATR	Advanced Test Reactor	
ATW	Accelerator Transmutation of Waste	
BEIR	Biological Effects of Ionizing Radiation	
BLIP	Brookhaven LINAC Isotope Producer	
CEQ	Council on Environmental Quality	
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	
CFR	Code of Federal Regulations	
CLWR	commercial light water reactor	
CPP-651	Chemical Processing Plant 651 (Building CPP-651)	
dBa	decibels A-weighted	
DOD	U.S. Department of Defense	
DOE	U.S. Department of Energy	
DOT	U.S. Department of Transportation	
EIS	environmental impact statement	
EPA	U.S. Environmental Protection Agency	
FDPF	Fluorinel Dissolution Process Facility	
FFTF	Fast Flux Test Facility	
FMEF	Fuels and Materials Examination Facility	
FONSI	Finding of No Significant Impact	
FPF	Fuel Processing Facility	
FR	Federal Register	
g	gravitational acceleration	
Hanford	Hanford Site	
HB	horizontal beam	
HEPA	high-efficiency particulate air (filter)	
HFIR	High Flux Isotope Reactor	
HVAC	heating, ventilating, and air conditioning	
I ⁴	International Isotopes Idaho, Inc.	
IAEA	International Atomic Energy Agency	
IEM	Interim Examination and Maintenance Cell	
INEEL	Idaho National Engineering and Environmental Laboratory	
INTEC	Idaho Nuclear Technology and Engineering Center	
IPF	Isotope Production Facility	
ISC3	Industrial Source Complex	
ISCST3	Industrial Source Complex (short-term model)	
LANL	Los Alamos National Laboratory	
LANSCÉ	Los Alamos Neutron Science Center	
LCF	latent cancer fatality	
LINAC	linear accelerator	
MASF	Maintenance and Storage Facility	
NAAQS	National Ambient Air Quality Standards	
NASA	National Aeronautics and Space Administration	
NEPA	National Environmental Policy Act	
NEPO	Nuclear Energy Plant Optimization	

NERAC	Nuclear Energy Research Advisory Committee
NERI	Nuclear Energy Research Initiative
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NI PEIS	<i>Final Programmatic Environmental Impact Statement for Accomplishing Expanded Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, Including the Role of the Fast Flux Test Facility</i>
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
OSHA	Occupational Safety and Health Administration
PCAST	President's Committee of Advisors on Science and Technology
PEIS	programmatic environmental impact statement
P.L.	Public Law
PM _{2.5}	particulate matter with an aerodynamic diameter less than or equal 2.5 microns
PM ₁₀	particulate matter with an aerodynamic diameter less than or equal to 10 microns
PNNL	Pacific Northwest National Laboratory
RCRA	Resource Conservation and Recovery Act
REDC	Radiochemical Engineering Development Center
RPL	Radiochemical Processing Laboratory
SNL	Sandia National Laboratories
SRPS	Stirling radioisotope power systems
SRS	Savannah River Site
SRTG	Small Radioisotope Thermoelectric Generator
SST/SGT	safe, secure trailer/SafeGuards Transport
TEDF	Treated Effluent Disposal Facility
TRIGA	training, research, isotopes General Atomics (reactor)
UZrH	uranium-zirconium-hydride
U.S.C.	United States Code
USGS	U.S. Geological Survey
WAG	waste area grouping
WIPP	Waste Isolation Pilot Plant
Y-12	Y-12 Plant